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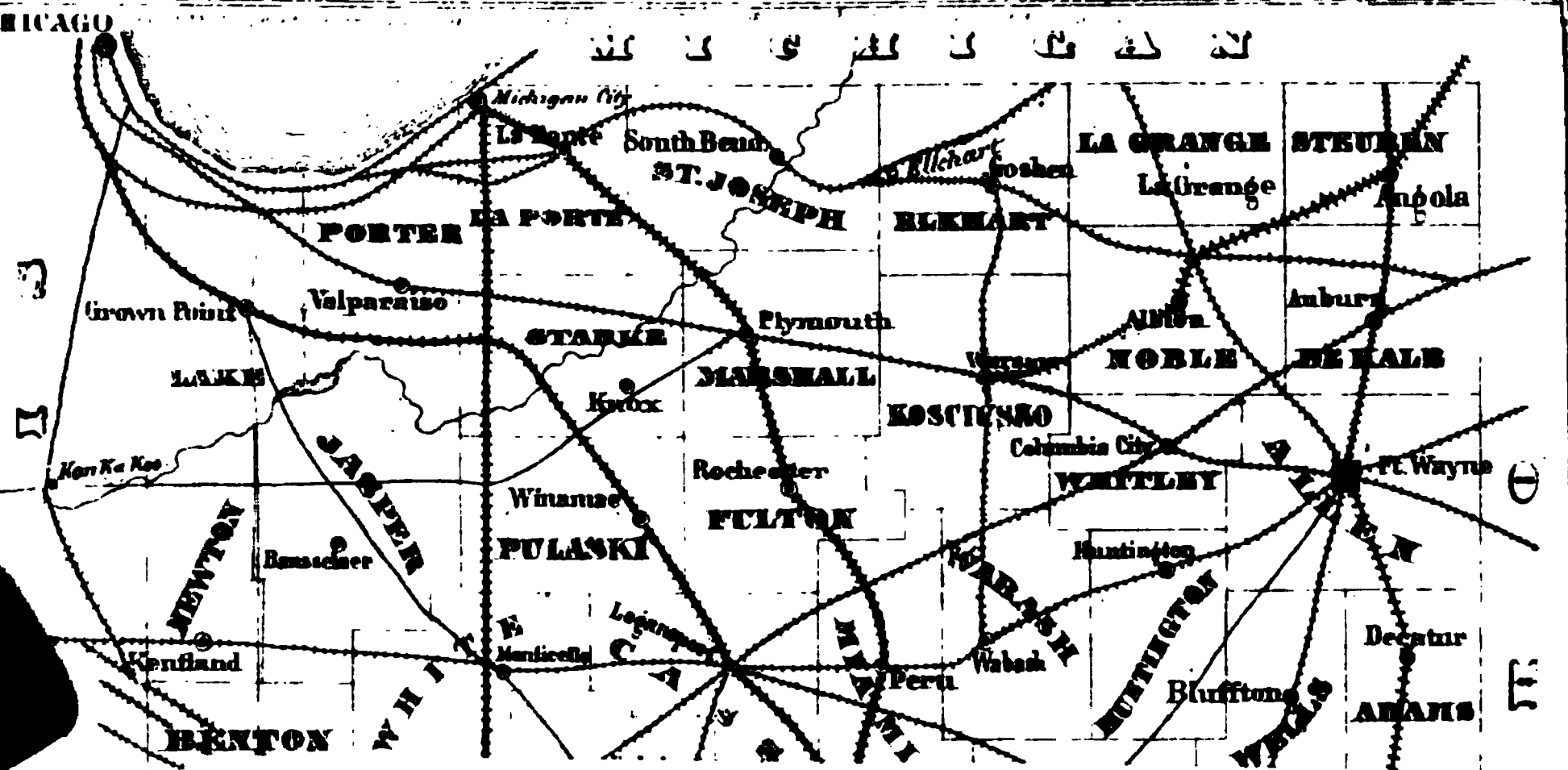
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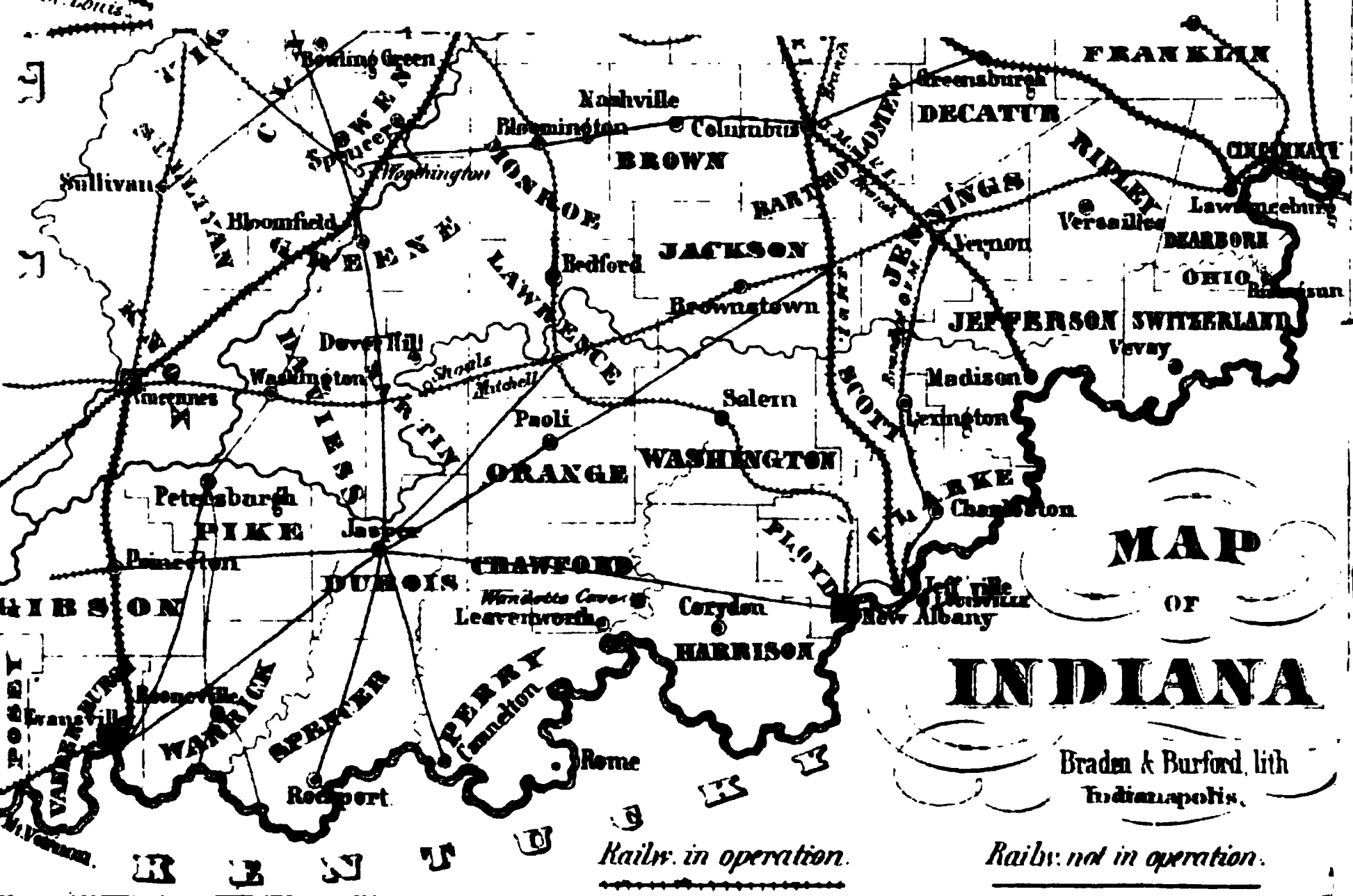
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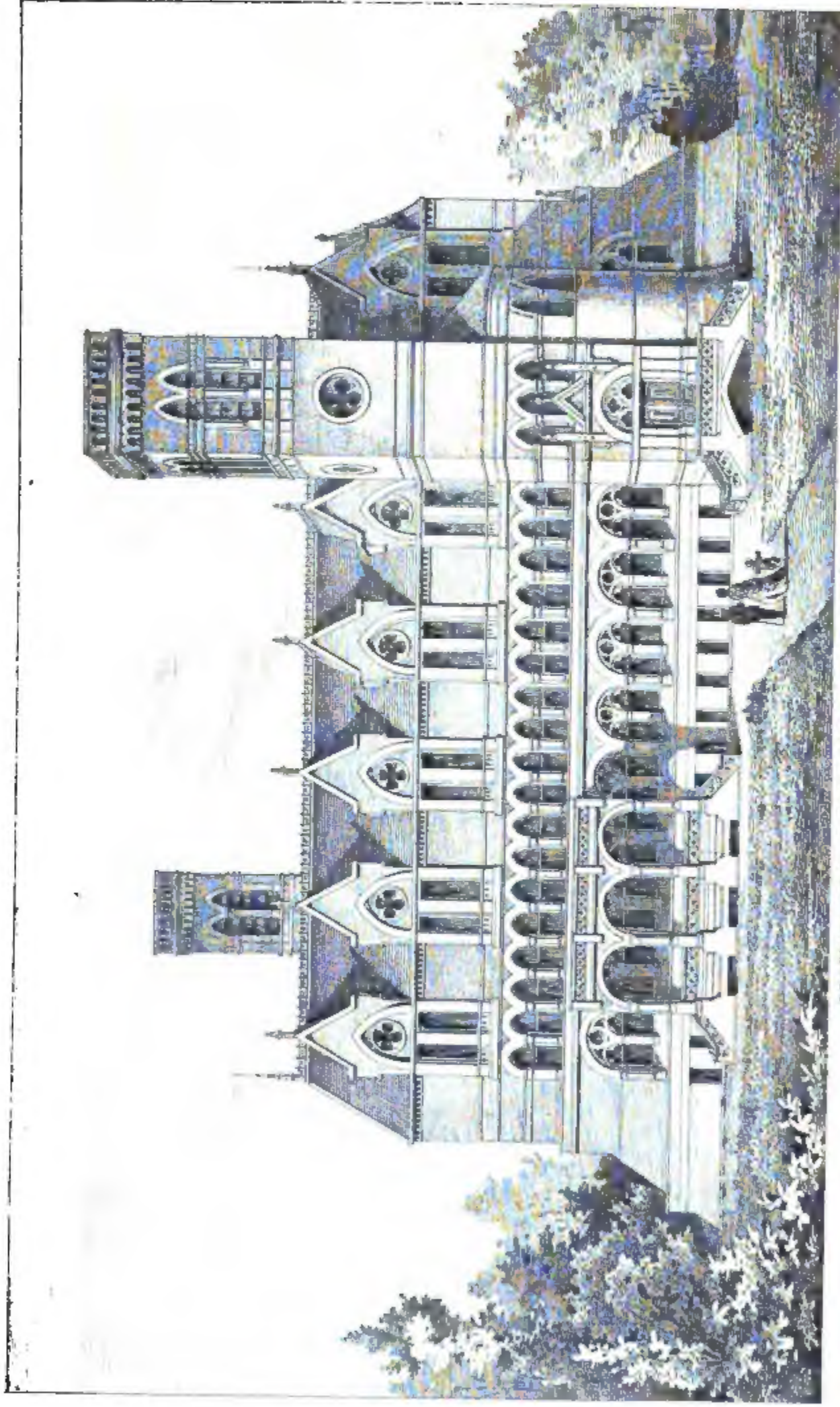












**INDIANA AGRICULTURAL COLLEGE,**  
*Purdue University at La Fayette.*

*D. A. B. 1890*

**FOURTEENTH ANNUAL REPORT**

39883

**OF THE**

**INDIANA**

**STATE BOARD OF AGRICULTURE,**

**1872,**

**INCLUDING THE REPORT OF**

**PROF. E. T. COX, STATE GEOLOGIST,**

**For 1871 and 1872.**

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**INDIANAPOLIS:**

**R. J. BRIGHT, STATE PRINTER.**

**1872.**





# OFFICERS OF THE INDIANA STATE BOARD OF AGRICULTURE.

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**PRESIDENT:**

**HON. JOHN SUTHERLAND, Laporte.**

**VICE-PRESIDENT:**

**HON. I. D. G. NELSON, Fort Wayne.**

**TREASURER:**

**CARLOS DICKSON, Indianapolis.**

**GENERAL SUPERINTENDENT:**

**H. W. CALDWELL, Indianapolis.**

**SECRETARY:**

**ALEX. HERON, Office in the State House, Indianapolis, Ind.**

---

## EXECUTIVE COMMITTEE.

**HON. JOHN SUTHERLAND, President *ex officio*.**

**H. CALDWELL. A. B. CLAYPOOL. L. A. BURKE. W. CRIM.**

---

## MEMBERS OF THE STATE BOARD OF AGRICULTURE.

- 1st District—L. A. BURKE, New Harmony, Posey county.  
2d District—F. BASLER, Sullivan, Sullivan county.  
3d District—F. C. JOHNSON, New Albany.  
4th District—W. B. SEWARD, Bloomington, Monroe county.  
5th District—BENJAMIN NORTH, Rising Sun, Ohio county.  
6th District—THOS. V. MITCHELL, New Salem, Rush county.  
7th District—JACOB MUTZ, Edinburg, Johnson county.  
8th District—THOS. DOWLING, Terre Haute, Vigo county.  
9th District—A. D. HAMRICK, Hamrick Station, Putnam county.  
10th District—A. B. CLAYPOOL, Connersville, Fayette county.  
11th District—WILLIAM CRIM, Anderson, Madison county.  
12th District—JOSEPH POOLE, Attica, Fountain county.  
13th District—H. CALDWELL, Wabash, Wabash county.  
14th District—STEPHEN DAVIDSON, Rochester, Fulton county.  
15th District—JOHN SUTHERLAND, Laporte, Laporte county.  
16th District—I. D. G. NELSON, Fort Wayne, Allen county.



AGRICULTURAL ROOM, STATE HOUSE,  
December, 1872.

*To the General Assembly of the State of Indiana :*

In accordance with the requirements of the act of the General Assembly, creating the Indiana State Board of Agriculture, we have the honor to herewith transmit the Fourteenth Annual Report of the Board, containing their proceedings for the year; reports from the county and district societies; essays on useful and interesting matters pertaining to industrial pursuits; together with brief reports of the proceedings of the Swine and Short-horn Cattle Breeders' Conventions, which have been held in Indianapolis during the present year.

It is to be regretted that means are wanting by which to procure statistical information concerning the agricultural and mechanical products of the State, and we would recommend that a law be passed requiring assessors to collect information relative to matters of this nature. We have included in the report, the statistics relative to the productions of agriculture of this State, taken from the United States Census Report for 1870, and an estimate of the principal agricultural products for the years 1871 and 1872, selected from the report of the Department of Agriculture. We take pleasure in acknowledging the courtesy of the Commissioner of Agriculture in sending us monthly reports of that department from which the above is taken.

It was intended to include the statistics of manufactured products, but, they have not yet been issued. It was the desire of the Board that the report should be issued at the earliest day practicable, and in our endeavor to comply with

its wish, it has been found exceedingly difficult, with the accumulating duties of the office, to procure more interesting matter or to arrange it in more desirable form.

It was expected that reports from nearly all of the county and district societies would have been received in time for insertion in tabular form, but as only about one-third of the number came to hand in time, this table is necessarily omitted, while those received are given in condensed form. As no premiums were offered for essays on various agricultural subjects we are deprived of this heretofore interesting portion of the report. However, through special favor, we are enabled to present some appropriate and interesting essay matter.

The proceedings of the Swine and Cattle Breeders' Convention is included herein, as also the article and accompanying tables of Sergeant Wappenhaus concerning the United States Signal Service system which will be found not only interesting but useful.

As the Annual Fair is a matter of deep interest to both exhibitors and the Board, we have given a succinct history of it in connection with the awards of premiums.

The Fair, taken all together, was more than ordinarily successful. In some departments, especially in live stock, the display was extraordinary.

The receipts were considerably in excess of the expenditures, which leaves the Board in a sound financial condition.

Good health has generally prevailed during the past year, which has also been one of great prosperity ; considering *all* crops, the yield, in both quantity and quality, was unprecedented, and we certainly have good reason to return heart-felt thanks to the Giver of all good for being thus bountifully blessed. As a consequence of full crops, the prices of grain and pork rule low.

The extraordinary deficiency in the rain fall for the last three years, has caused nearly all the small streams to dry up and the large ones to become so low that great inconvenience has been experienced in procuring water for stock, manufacturing purposes and domestic use.



Accompanying this report will be found the report of our able and indefatigable State Geologist, for the years 1871 and 1872, in which is fully set forth the extent and value of the coal fields as far as the explorations and analysis have been prosecuted, and which show that our mineral resources present great inducements to immigration, and the investment of capital, which must result in greatly enhancing the wealth of the State.

In view of the great value of the Geological survey and the demand for its more rapid prosecution, it is considered advisable to increase the annual appropriation for this purpose. In this connection also, we can not refrain from an earnest recommendation that the salary of the Geologist be increased, commensurate with the value of the service rendered. Simple justice should prompt this.

Much as has been accomplished by the Board through its agency, there is still a broad field open for more extended usefulness, to accomplish which the Board should be constituted a Bureau of Agriculture, with increased facilities for collecting samples of the various agricultural products and statistics relating to the general advancement and prosperity of the State.

It affords us great pleasure to acknowledge the uniform courtesy and kindness of the Board and all others connected therewith, especially to O. F. Mayhew, for valuable assistance in the office, being long connected therewith; and to the Superintendent, H. W. Caldwell, to whose exertion is due to a great extent the success of the last exhibition.

**JOHN SUTHERLAND, President.**

**ALEX. HERON, Secretary.**



**POLAND CHINA.**

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# INDIANA BOARD OF AGRICULTURE.

## FINANCIAL TRANSACTIONS, 1872.

Jan. 1. Cash on hand.....	\$2,393 30
April 5. Annual State appropriation.....	1,500 00
Oct. 5. Sale of gate tickets.....	19,262 25
Oct. 5. Sale of amphitheater tickets.....	765 50
Oct. 5. Sale of booths, eating stands, etc.....	3,456 25
December. Interest on U. S. 5-20 Bonds.....	202 00
	<hr/>
	\$27,579 30

### DISBURSEMENTS.

Mileage and per diem of members.....	2,823 08
Salaries.....	1,230 00
Printing and advertising.....	979 10
Improvements and repairs.....	5,613 21
Incidental and stationery.....	779 70
Medals, music, fuel, meal tickets and labor.....	1,778 70
Committees, gate keepers, police, etc.....	1,585 00
Expenses of Fair, 1871.....	237 25
Old claims.....	136 50
	<hr/>
	\$15,182 49

Cash premiums .....	9,381 00
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\$24,563 49

Cash on hand .....	3,015 81
United States Bonds.....	3,000 00

33 Silver Medals; 19 Bronze Medals.

### GEOLOGICAL DEPARTMENT.

January 1st, 1872, cash on hand.....	\$2,911 68
March, to cash, annual appropriation.....	5,000 00
	<hr/>
	\$7,911 68

### DISBURSEMENTS.

December 20th, cash orders paid.....	4,602 06
	<hr/>
Balance on hand.....	\$3,309 62

ALEX. HERON,  
Secretary.

**INDIANA**

**STATE BOARD OF AGRICULTURE,**

***JANUARY, 1872.***

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**ANNUAL MEETING.**

---

**JANUARY 2, 1872.**

**THE MEMBERS OF THE STATE BOARD OF AGRICULTURE,** with the Delegates from County and District Societies, met in their rooms in the State House and were called to order by the President, Hon. J. D. Williams.

The Members of the State Board being called, the following persons answered to their names, viz.:

- 2d District—J. D. Williams.
- 4th District—George A. Buskirk.
- 6th District—T. V. Mitchell.
- 7th District—Jacob Mutz.
- 8th District—Thomas Dowling.
- 9th District—A. D. Hamrick.
- 10th District—A. B. Claypool.
- 11th District—William Crim.
- 12th District—J. Poole.

- 13th District—H. Caldwell.
- 14th District—S. Davidson.
- 15th District—John Sutherland.
- 16th District—I. D. G. Nelson.

The names of the County and District Societies of the State were then called, when the following named persons answered as delegates from said Societies, viz :

- Boone county, John Higgins.
- Bartholomew county, R. Jones.
- Delaware county, M. C. Smith.
- Fayette—Alexander Heron.
- Fountain county, William Trullinger.
- Floyd county, F. C. Johnson.
- Fulton county, C. H. Robbins.
- Gibson county, Robert Mitchell.
- Grant county, H. Shugart.
- Hamilton county, L. O. Clippart.
- Harrison county, S. B. Lucket.
- Henry county, N. R. Elliott.
- Jackson county, S. W. Holmes.
- Johnson county, C. B. Tarlton.
- Jasper county, W. N. Jones.
- Jennings county, J. V. Millhous.
- Laporte county, J. N. Whitehead.
- Knox county, J. D. Williams.
- Madison—William Crim.
- Monroe county, W. B. Seward.
- Marion county, F. Beeler.
- Parke county, T. Nelson.
- Perry county, D. C. Donohue.
- Posey county, Magnus T. Carnahan.
- Rush county, O. C. Hackleman.
- Randolph county, J. D. Smith.
- St. Joseph county, J. Skinner.
- Sullivan county, Calvin Taylor.
- Union county, Eli Pigman.
- Vigo county, Thomas Dowling.

Wabash county, John Dufton.

Wayne county, R. Baldrige.

Cambridge City Agricultural Society—A. B. Claypool.

Thorntown Union Society—George E. Conrad.

Edinburg Union—J. A. Thompson.

Bridgeton Union—J. N. Miller.

Union Agricultural Society—J. B. Edwards.

Pendleton Agricultural Society—William Cox.

Indianapolis Agricultural, Horticultural, and Mechanical Association—John Fishback.

Mooreville—E. A. Oleman.

Decatur Township—J. J. W. Billingsly.

South Eastern Indiana Agricultural Society—O. P. Cobb.

Switzerland and Ohio—J. B. Girard.

On motion of A. D. Hamrick, the reading of the reports of the officers was postponed until the afternoon session of the Board.

Mr. Hamrick took the floor and made some very appropriate remarks, suggesting and desiring the Delegate Board to give such ideas and advice to the State Board and its officers as will be to the interest and advantage of the agricultural and manufacturing interests of the State.

On motion of A. B. Claypool, the petition presented by the cattle raisers was taken from the files, read, and discussed at some length by Messrs. Claypool, Mitchell, Poole, Holmes and Sutherland, when, on motion of Mr. Holmes, the petition was referred to the Committee on Premium List.

On motion of Mr. Hamrick, the Board accepted an invitation from the Indiana State Horticultural Society, to be present at their rooms to hear an address, at 7½ o'clock this evening.

Mr. Jones, delegate from Jasper county, made some very appropriate and pertinent remarks in regard to the formation of farmers' clubs, in the various counties and townships of the State.

Remarks were also made by Mr. Hamrick and others.

Mr. Jones offered the following resolution:

*Resolved*, That the Delegate Board recommend the counties throughout the State to form Township Farmers' Clubs, to encourage the agricultural, mechanical and stock-raising interests of the State.

Which, after some discussion, was adopted.

Mr. Roberts, of Fulton, offered the following resolution:

*Resolved*, That this Delegate Board instruct the State Board to recommend each County Society to pay their delegates at least railroad fare, and all necessary expenses, to and from meetings of the State Board in January.

On motion, the Board adjourned to meet at 2 o'clock, P. M.

---

JANUARY 2, 1872,  
2 O'CLOCK, P. M.

The State and Delegate Board met pursuant to adjournment, President J. D. Williams, in the chair.

The Board being called to order, the roll was called, and all answered to their names, except L. A. Burk, J. C. Shoemaker and Benj. North.

Additional delegates appeared, presented their credentials and had their names properly enrolled.

The President then presented and read his annual address, as follows:

### PRESIDENT'S ANNUAL ADDRESS.

*Gentlemen of the State and Delegate Board of Agriculture:*

I am glad to meet you again at the capital of our great

State, to have an interchange of sentiment on the subject of Agriculture, Horticulture, Mechanics and Arts.

Since our last assembling here, we have had an exhibition on our finely fitted Fair Grounds that was unsurpassed by any one of former fairs in point of numbers and quality of articles on exhibition; while the attendance was large, yet it did not reach the fair of 1869 in the number of visitors.

We were often congratulated by our friends during and since the fair, who said, "well, you had a grand success pecuniarily." And it would look so to most men, but when we come to pay our premiums, which we think are liberal, and pay the expenses of repairs and expense of running the Fair, we have but a small surplus left to start upon for the next year.

Gentlemen, you can, perhaps, say for Indiana what few other States can, that you have always paid your premiums in full, dollar for dollar. True, in 1860 we were not able to pay at the close of our fair, but have since paid every dollar of our indebtedness for that unfortunate year, and stand on safe footing, with a small sum remaining in your treasury, which I hope may never be reduced below what it now is.

Since your last meeting here it was ascertained that unless a certain piece of ground was purchased, lying between the Peru Railroad and the southeast corner of your Fair Grounds, for the purpose of a side track to reach the grounds, we would be deprived of accommodating a large portion of our visitors with conveyance to and from the grounds. In order to remedy this the Board appropriated the sum of \$3,000, and purchased said ground, about two and one-half acres. It is believed that we can, at any time we wish, sell this land at a profit.

It is sometimes asked why our receipts are not more than reported; I would say until the last two or three years we allowed shows of almost all descriptions a place in our grounds, but have refused them admittance for the last two years, which lessened our receipts; notwithstanding which I would recommend that we continue to exclude them.

Again, we used to charge an entrance fee of ten per cent. on all entries, which was a source of revenue to the society; this has also been abolished for the last two years. I am of the opinion the society will be compelled to return to the system of entrance fees or increase the price of admission tickets so that they may always have a sufficient sum on hand to make all repairs or pay premiums in case of bad weather or any other misfortune that might befall the society.

Gentlemen, the condition of your finances will be given in detail by your able Secretary and Treasurer. The condition of your grounds will be given you by your Superintendent.

The Geological Report for 1870, by Professor E. T. Cox, has been received, and will soon be ready for distribution.

This volume of the report will contain about three hundred pages, and is embellished by a number of excellent lithographic views, such as blast furnaces, geological objects and sketches of scenery at Indian Springs, in Martin county, and West Baden Springs, in Orange county, Indiana. Three large maps also accompany the report, on which are laid down the coal mines and out-crops of coal, iron ore, etc., in the counties of Sullivan, Daviess and Martin, and a smaller map with horizontal section, showing the coal strata in the vicinity of Washington, the county seat of Daviess county.

The report is also well furnished with diagram sections, showing the vertical range and extent of the coal in the counties surveyed.

It will also be perceived by this report that the celebrated iron-smelting or block coal, which had already been traced from the northern limits of the coal measures to Greene county, has now been followed along the eastern margin of the field to the Ohio river, making in all an area of about 288,000 acres.

In view of the great importance of the Indiana block coal for manufacturing iron, the benefit that will accrue to the State from this discovery can scarcely be over-estimated.

The three counties of Sullivan, Daviess, and Martin are



reported upon in detail, and general remarks are made on the geology of a number of other counties.

The quantity of coal available for market purposes in the three counties surveyed in detail is estimated to be not less than 8,371,217,916 tons.

In addition to coal, large deposits of iron ore are reported in Martin county, two of which are estimated to be thirty feet in depth.

Notwithstanding the most of these ores contain a large percentage of silica, the geologist is of the opinion that it is practicable to work them *per se*, and also that they will make admirable mixture with the specular iron ores of Missouri. He also calls attention to the French Lick, West Baden, Indian and Trinity mineral springs, and the Chalybeate springs at Greencastle, and gives an elaborate analysis of their waters.

A large number of analyses of coals, iron ores, etc., are also contained in the report, together with much other information, which must prove of great value to the State both in inducing immigration and the investment of capital.

In consideration of the great importance of the geological survey to the industrial interests of the State, it is proper to remark that the present quarters of the Geologist are entirely too small and incommodious, and I would recommend that the Board request from the Legislature more liberal provisions in these respects.

J. D. WILLIAMS.

The annual report of the Secretary, Mr. Joseph Poole, was next presented, as follows:

### SECRETARY'S REPORT.

*To the President, Members and Delegates of the  
Indiana State Board of Agriculture:*

GENTLEMEN—I herewith submit for your examination and consideration, a report and statement of the receipts

and disbursements of the State Board of Agriculture and State Geologist for the year ending January 1, 1872, and such other information as I think of importance to the interest you represent. Your Treasurer, Carlos Dickson, has received and is chargable with the following amount of money. For a detailed statement I would refer you to his report:

Total receipts from all sources during the year...\$23,106 71

#### 1871—EXPENDITURES.

October 7, cash premiums paid on Live Stock

Department.....	\$5,759 00
Cash premiums paid Agricultural Department....	1,096 00
Cash premiums paid Mechanical Department.....	941 00
Cash premiums paid Miscellaneous Department..	500 00
Cash premiums paid in Non-enumerated Department .....	59 50
Total cash premiums paid.....	\$8,355 50

#### MECHANICAL DEPARTMENT.

One gold medal, valued at \$100.....	\$100 00
Twenty-seven silver medals, valued at \$30.....	810 00
Sixteen bronze medals, valued at \$20.....	320 00
Ten diplomas, valued at \$10.....	100 00

#### MISCELLANEOUS DEPARTMENT.

Two silver medals, valued at \$30.....	\$60 00
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#### NON-ENUMERATED DEPARTMENT.

One silver medal, valued at \$30.....	\$30 00
One bronze medal, valued at \$20.....	20 00
One hundred and thirty-nine diplomas in all Departments, valued at \$20.....	2,780 00

Total value of premiums awarded in cash, medals and diplomas.....\$12,575 50

There yet remains on the cash order book premiums uncalled for, as follows :

In Mechanical Department.....	14 00	
In Agricultural Department.....	191 00	
In Miscellaneous Department.....	10 00	
In Unenumerated Department.....	42 00	
Total amount not paid.....	————	\$257 00

Total amount of premiums awarded, paid  
and unpaid for 1871..... \$12,832 50

RECAPITULATION OF EXPENSES.

Cash premiums awarded.....	\$8,564 50
Mileage and per diem of members.....	2,003 07
Officers' salaries.....	1,660 00
Real estate purchased.....	3,000 00
Printing, including new plates.....	1,070 95
Improvements on Fair Grounds.....	6,771 10
Incidental expenses.....	650 53
Stationery, etc.....	168 66
Furniture, etc.....	15 00
Expense of fair medals, etc.....	2,604 17
Expense of superintendents, police, gate keepers, committees, laborers, etc.....	2,016 04
Old claims for prior years paid.....	1,313 21

Total amount of orders issued..... \$29,837 23

RESULTS.

Total amount receipts for the year...	\$23,106 71
Amount on hand last report.....	12,586 37
Receipts for the year and on hand...	\$35,693 08
Total expenses for the year.....	29,837 23
Amount on hand.....	\$5,855 85

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Deduct real estate purchased, im- provements on fair ground and old debts paid.....	\$11,084 31
Actual current expenses for the year.	\$18,752 92
Amount received during the year.....	\$23,106 71
Amount of ordinary expenses.....	18,752 92
Amount received over ordinary ex- penses during the year.....	\$4,353 79

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## GEOLOGICAL DEPARTMENT RECEIPTS.

Amount on hand last report.....	\$2,787 71
Received by Treasurer State appropriation.....	5,000 00
Total amount.....	\$7,787 71

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## DISBURSEMENTS.

Paid for salaries.....	\$4,524 50
Paid for contingent expenses.....	836 03
	5,360 53
Balance in Treasury.....	\$2,427 18

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I herewith present the vouchers for all orders issued during the year properly itemized and certified to be correct by the State Geologist, together with the Treasurer's receipts for all moneys received and all other papers of importance connected with the finance of that department. The State Geologist reports some outstanding claims that probably will be presented for your consideration during the present session.

## LIBRARY.

The old claim against the estate of your former Secretary, A. J. Holmes, for \$200, for money appropriated to purchase books and drawn by him, and not used for that purpose, has been disposed of, by the State Board passing a

resolution donating the amount to the children of the deceased. Many valuable additions have been made to the Library during the year in the shape of reports, etc., from other States. A valuable collection of Massachusetts reports have been presented by ———, of that State, for favors of a similar character from us, for which he deserves and undoubtedly has our thanks.

Many new and valuable works on Live Stock and Agriculture are now published and in course of publication, which certainly should have a place in our Library, and I would suggest the propriety and importance of an appropriation for that purpose.

#### OLD CLAIMS.

The suit commenced against the Citizens Street Railroad Company of Indianapolis for their subscription remains in the Supreme Court undecided as reported at the last annual meeting of this Board. There is some \$1,500 due from other parties on the old subscription list—most of which are entirely worthless. Your Secretary under the resolution of your Board, has been using his best efforts to collect or secure any subscriptions that might be available without incurring unnecessary and unjustifiable expense, and has received and paid into your Treasury \$298.33.

The old claim against this Board in favor of the Indianapolis Agricultural, Mechanical and Horticultural Society was compromised and settled, at the February meeting of this Board, by paying them the sum of \$638 in full for the entire amount claimed.

#### STATE FAIR.

Your State Fair during the present year was one of the very best exhibitions ever held in the State. The entries in every department were very large, and the competition for premiums spirited and interesting. The whole number of entries amounted to over four thousand; being over one thousand more than was made at the Fair of 1870.. Much

interest was manifested in the Live Stock Department, and some of the best horses, cattle, hogs and sheep, of the United States were present. The cattle were unusually fine, and the exhibition will long be remembered by all lovers and admirers of fine stock, who witnessed the show. Such men as Morgan and Greer, of Ohio, Ryburn and Sandusky, of Illinois, Warfield and Logan, of Kentucky, Stephenson, Cobb, Wilson, Caldwell, Thrasher, Louder, Meredith, Baldrige, Monroe, and a host of others from every part of our own State were present, exhibiting a lively interest in the exhibition and show of some of the noblest animals in the world.

The occupation and aim of such men make them benefactors to the world, and a worthy and noble example in the right direction. The number of visitors was not so great as the exhibition deserved, but was good, and was sufficiently large to make the Fair financially a success.

All the officers appeared to do their duty—were courteous and kind to the visitors and exhibitors, and did all in their power to make them comfortable and satisfied. No accident or other unpleasant occurrence happened to mar the interest and pleasure of the occasion.

#### TIME OF HOLDING FAIR.

I would again suggest that the time for holding our fairs should be so arranged as not to conflict with Ohio, Illinois, or the St. Louis fairs. If an arrangement could be made so that Ohio would hold her fair first, Indiana second, Illinois third and St. Louis fourth, I am satisfied that it would be much to the interest of all. St. Louis has her time permanently fixed for the first Monday in October, annually, and I would recommend that for our own interest we should not fix our time so as to conflict with her. We have done so for the last two years, and I know that hundreds of exhibitors and visitors have gone to St. Louis from Western Indiana and Eastern Illinois that would have been with us if our time had been different.

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COUNTY AND DISTRICT SOCIETIES.

The County and District Societies are generally in a healthy and prosperous condition. Their exhibitions and fairs this year have generally been successful, and many of them large and interesting. Some of those societies now hold grounds and improvements nearly equal to those of the State Board, and manifest much zeal, enterprise and interest in the development and improvement and agriculture and its products in every part of the State.

Reports from nearly all the Societies in the State have been received, and will be published in the forthcoming State Board and Geological Report for 1871.

The number of societies in the State is about fifty, from which forty-five reports have been received. I have furnished during the year, with considerable extra labor, quite a number of constitutions and by-laws for the formation of new societies, and think there will be quite an increase in the number for the year 1872. There should be good legal forms in accordance with our agricultural laws, printed and kept on hand for distribution whenever required.

## FAIR GROUND IMPROVEMENTS.

Since the last annual meeting of this Board, by order of the Board at its February meeting, a piece of ground of some two and a half acres has been purchased—not in addition to our present Fair Grounds, but for the purpose of securing and controlling a track from the Peru Railroad to our grounds. This piece of ground is now owned by the Board, and cost \$3,000. Important and valuable improvements have been made upon the Fair Grounds during the present year, causing the outlay of some \$6,771 10. New and commodious miscellaneous and furniture halls have been built; bridges, stalls, pens, privies, and doors to the other halls have been made, with many minor improvements and repairs, which were necessary for the comfort and convenience of visitors and exhibitors. With a little more work and expenditure of money in leveling the grounds, remov-

ing old trees, and stumps, etc., our Fair Ground, with the exceptions of the fence and some of the stalls, would be in splendid condition and compare very favorably with any fair ground in the west. At the February meeting, it was thought by the Board that our present grounds were rather small for holding our annual exhibitions, and a committee was appointed to examine other grounds and ascertain what price could be obtained for those we now own, and report to the Board the present session. That committee has been performing that duty, and I presume will make a full report at the proper time for your consideration.

#### STATE BOARD AND GEOLOGICAL REPORT.

Your annual State Board and Geological reports for the present year are now being published, and will be forthcoming as soon as the printing and binding can be done. The Geological report is required by law to be published in the same volume with the agricultural, but owing to causes therein stated, it did not appear in our last annual report. Since the publication of that volume, your able and efficient State Geologist, Professor E. T. Cox, has been constantly engaged, when at his office and not attending to other pressing duties, in writing and completing his present report, which is now in the hands of the printers. From what I have seen of it I feel warranted in saying that it will fully sustain his high reputation as an able, thorough, practical geologist, and will be of immense value in developing the mineral resources and wealth of the State.

Your State Board reports will be as complete as possible, and contain all the proceedings of your Board; all entries and premiums awarded at your State Fair; reports of the County and District Societies, and much other valuable information. In conclusion, I would say to the Delegate Board, representing, as they do, the different District and County Agricultural Societies of the State, you have my sincere thanks for the kindness extended to me as Secretary and member of this Board during the year, and I would



urge upon every delegate and every District and County Society in the State the great necessity and importance of a cordial feeling, general union of interest, and co-operative action between and by the State, District and County institutions. You both have but one common interest. The success of one should be the pleasure and gain of the other; and the great aim should be the development of the great producing elements of wealth of the whole State for the good of her entire community.

To the members of the State Board proper, I have no words that will express my warm feelings and kind thanks for your forbearance, kindness and assistance to me in the performance of my duties. You all have my kind regards, best wishes and sincere thanks.

JOSEPH POOLE,

Secretary Indiana State Board Agriculture.

JANUARY 2, 1872.

# TREASURER'S REPORT.

CARLOS DICKSON, *Treasurer, in account with*

*Indiana State Board of Agriculture:*

## RECEIPTS.

1871.

January 1, to cash on hand .....	\$6,586 37
January 5, to cash J. S. Benson, for logs, lumber, etc.....	213 00
January 21, to Jos. Poole, for city subscriptions	98 33
March 7, to cash sale of \$3,000 U. S. bonds, at 11½ premium.....	3,345 00
April 26, to cash on State annual appropriation..	1,500 00
July 1, to cash interest on \$3,000 U. S. bonds, premium 13½.....	101 93
July 8, to city subscriptions from Joseph Poole.	200 00-

October 9, sale of tickets, 62,866 gate at 25c, \$15,716.50; and 10,309 amphitheater at 10c, \$1,030.90 .....	\$16,747 40
October 9, rent on booths, eating stands, etc.....	3,149 00
October 7, entrance fees, live stock department..	210 00
October 7, Maj. Conkling, advertising on fence..	73 50
January 1, 1872, interest on \$3,000 U. S. bonds, prem. 9½.....	98 55
M., J. & I. R. R. Co., sale of 1,480 tickets.....	370 00
	<hr/>
	\$32,693 08

## DISBURSEMENTS.

December 30, by cash paid general expense orders.....	\$21,606 28
December 30, by cash paid live stock orders.....	6,007 00
December 30, by cash paid mechani- cal orders.....	971 00
December 30, by cash paid horticul- tural orders .....	560 00
December 30, by cash paid miscella- neous orders.....	260 00
December 30, by cash paid agricul- tural orders .....	602 00
December 30, by cash paid fine art orders .....	243 00
December 30, by cash paid unenu- merated orders.....	50 50
December 30, by cash on hand .....	2,393 30
	<hr/>
	\$32,893 08

1872.

January 1, to cash on hand .....	\$2,393 30
January 1, to U. S. 5-20 bonds on hand .....	3,000 00
	<hr/>
	\$5,393 30

GEOLOGICAL DEPARTMENT.

CARLOS DICKSON, *Treasurer, in account with*  
*Indiana State Board of Agriculture:*

1871.

January 1, to cash on hand.....	\$2,787 71
April 18, annual State appropriation.....	5,000 00
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	\$7,787 71
December 30, by cash paid orders...	\$4,876 03
December 30, by cash on hand .....	2,911 68
	<hr/>
	\$7,787 71

The report of the Superintendent, Mr. Jacob Mutz, was then read by that gentleman, as follows:

SUPERINTENDENT'S REPORT.

*Mr. President and Gentlemen of the*  
*Indiana State Board of Agriculture:*

On entering upon the duties of General Superintendent, I received from the former Superintendent, Mr. Benson, a schedule of the movable property belonging to the Board; and, although fully satisfied that there was nothing enumerated in this schedule that was not on hand at the expiration of Mr. Benson's term of office, by some means not apparent there was little of it to be found.

Such of this property as came into my hands is still on the grounds.

I would suggest that a suitable and secure place be fitted up in some of the buildings in which to store the movable property for safe keeping.

I found the horse stalls and fences much dilapidated, and had them repaired at the least practicable expense.

By Tuesday of the fair week it was apparent that the number of horse stalls was less than would be required, and about one hundred temporary stalls were immediately put up to accommodate the horses entered for exhibition.

Quite a number of pens had also to be erected, which shows conclusively that the present number of stalls and pens are insufficient for the rapidly increasing interest in these annual exhibitions.

Besides the stalls and pens, there has been erected on the grounds during the past season a commodious miscellaneous and furniture hall, two bridges, and two water closets, one of which is a large water closet for gentlemen.

Many rough and unsightly places on the grounds have been leveled, and some unsightly dead trees removed. Doors have also been hung to the several halls as ordered.

The cost of these improvements up to the time of holding the Fair was about \$5,874. Proper vouchers for these expenditures are herewith submitted, except those in the hands of the Secretary.

The unusual drought of the past year rendered it very difficult to obtain from the wells on the ground the quantity of water requisite for the purposes of the Fair. After exhausting every other available expedient, I resolved to accept the proposition of Mr. R. R. Rouse, of this city, to put down a two inch driven well, under a guarantee that it should not fail to furnish the required quantity of water. The result proved highly satisfactory. This well supplied a constant two inch stream of water for three successive days, seventeen hours each day, without showing any indications of failure. It was also found necessary to put down four additional wells of this kind to provide sufficient water. Three of these were ordered to be retained by the Executive Committee.

For the better accommodation of exhibitors, I would recommend the erection of a substantial and commodious power hall. The planting of a considerable number of shade trees is also recommended.

A schedule of the moveable property belonging to the Board is in the hands of the Secretary.

Respectfully submitted,

JACOB MUTZ,

General Superintendent State Board.

On motion, the Secretary and Treasurer's reports were referred to the Committee on Fair Grounds.

The President then announced the following Standing Committees, viz.:

Finance—Messrs. Caldwell, of Wabash; Crim, of Madison; Nelson, of Allen; M. C. Smith, of Delaware; R. Mitchell, of Gibson.

Fair Grounds—Messrs. Hamrick, of Putnam; Burke, of Posey; Mutz, of Johnson; Donahue, of Putnam; Tarkington, of Johnson.

Premium List—Messrs. Mitchell of Rush; Sutherland, of Laporte; Claypool, of Fayette; S. W. Holmes, of Jackson; R. Baldrige, of Wayne.

Rules and Regulations—Messrs. Shoemaker, of Perry; North, of Ohio; Davidson, of Fulton; D. C. Taylor, of Sullivan; Thomas Nelson, of Parke.

Unfinished Business—Messrs. Buskirk, of Monroe; Poole, of Fountain; Dowling, of Vigo; Hackleman, of Rush; F. Beeler, of Marion.

Mr. Mitchell, of Gibson, presented to the Board for their examination a very nice specimen of winter wheat, and made some remarks as to its quality and value as one of the cereals of the State.

Mr. Shugart presented some papers as entries in field crops for premium on one acre of corn, and after much discussion by Messrs. Shugart, Beeler and others, on motion, said papers were referred to the Committee on Field Crops.

On motion, the following persons were appointed a Committee on Field Crops, viz.:

Messrs. Carnahan, Samuel Gilliland and E. A. Oleman.

The following resolution was offered by Mr. Donahue, as an amendment to the Constitution of the Indiana State Board of Agriculture:

*Resolved*, That Article 11 of the Constitution of the Indiana State Board of Agriculture be amended to read as follows: That delegates

attending the annual meeting of the State Board, shall be allowed a sum equal to the actual expenses incurred by reason of such attendance. Nor shall the members or officers of the State Board elect be paid any sum of money as compensation or otherwise, except by order of the Board elect.

Which was ably discussed by Messrs. Donahue, Buskirk, Williams, Cobb, Hamrick and others; when a motion was made by Mr. Holmes, of Jackson, to refer the resolution to a committee of five to be appointed by the President of the Board; which motion was adopted.

Whereupon the President appointed the following named persons said committee, viz.: Holmes, Donahue, Buskirk, Carnahan and Dowling.

The following resolution was offered by A. D. Hamrick :

*Resolved*, That the next Indiana State Fair be held commencing September 30th, 1872, to Saturday, October 5th, inclusive, and that notice of said appointment be telegraphed to adjoining States. Adopted.

On motion the Board proceeded to nominate candidates for members of the State Board for the first, second, third, fourth, seventh, fourteenth, fifteenth and sixteenth districts, which resulted in the following nominations, viz.:

First District—Robert Mitchell, of Gibson; L. A. Burke, of Posey.

Second District—Ferdinand Bazler, of Sullivan.

Third District—F. C. Johnson, of Floyd; Cyrus T. Nixon, of Floyd.

Fourth District—S. W. Holmes, of Jackson; W. B. Seward, of Monroe.

Seventh District—Jacob Mutz, of Johnson; Franklin Landers, of Marion.

Fourteenth District—Stephen Davidson, of Fulton.

Fifteenth District—John Sutherland, of Laporte.

Sixteenth District—I. D. G. Nelson, of Allen.

On motion, it was ordered that the election take place to-morrow morning, at 10 o'clock.

On motion of Thomas Dowling, the following resolution was presented:

*Resolved*, That the President of this Board be requested to memorialize the next General Assembly in favor of enlarging the office building used by the State Geologist, that room being entirely inadequate to the growing business of that officer; and further, that his Excellency, the Governor, be most respectfully requested to make such mention of the wants of the Geological Department, in his message to the Legislature, as may appear to him proper in the premises.

Which resolution was adopted.

On motion, the Board adjourned to meet to-morrow morning at 9 o'clock.

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JANUARY 3, 1872, 9 O'CLOCK, A. M.

President J. D. Williams in the chair.

The roll being called, all the members were present and answered to their names.

The minutes of the Board were read, and, after some additions, were adopted.

Upon the suggestion of A. D. Hamrick, and by consent of the Board, Mr. Jennings exhibited a corn planter to the Board, and explained its merits and its advantages.

On motion, a committee of three was appointed to examine and report upon the merits of the planter; Messrs. North, of Ohio, Baldrige of Wayne, Seward of Monroe, were appointed said committee.

On motion, the Board went into the election of members for the first, second, fourth, seventh, thirteenth, fourteenth, fifteenth and sixteenth districts of the State.

The President appointed F. Beeler, Alex. Heron, and M. C. Smith, tellers. The ballotings showed the election of the

following named persons as members of the Board for the next two years, viz.:

First District—L. A. Burke, of Posey.

Second District—Ferdinand Bazler, of Sullivan.

Third District—F. C. Johnson, of Floyd.

Fourth District—W. B. Seward, of Monroe.

Seventh District—Jacob Mutz, of Johnson.

Fourteenth District—Stephen Davidson, of Fulton.

Fifteenth District—John Sutherland, of Laporte.

Sixteenth District—I. D. G. Nelson, of Allen.

The Hon. Solomon Meredith being present, on motion of Thomas Dowling, he was declared, by unanimous consent, an honorary member of this Board.

Thos. Dowling, from the committee on proposed amendment to the constitution, made the following majority report:

MR. PRESIDENT:

The select committee on the proposed amendments to the Constitution of the State Board of Agriculture are clearly of the opinion that no change should be made at the present session of the delegates, for the reasons that—

1st. No expressions of a desire for such change has been made by the local societies.

2d. The expenses of the members of the Delegate Board have been paid, so far as we have knowledge, by the local societies, showing that the county and district societies have the means and disposition to act on such matters without calling upon the State Board.

3d. The proposed change would entail upon the treasury of the State Board a heavy expense, and seriously curtail its capacity to carry on its operations at each recurrence of annual fairs.

4th. The original design of the organization providing for a Delegate Board was in the nature of an advisory body, and for the election of a State Board which should fairly represent the county and district societies.



For these reasons, and others which might be enumerated, the majority of the committee beg leave to recommend the adoption of the following resolution:

*Resolved*, That it is not expedient to change, alter or amend, at present, the Constitution and By-Laws of the Indiana State Board of Agriculture, and especially Article 11; and that said proposed amendment be indefinitely postponed.

GEORGE A. BUSKIRK,  
M. T. CARNAHAN,  
THOMAS DOWLING,  
Committee.

The minority report was submitted by Mr. Holmes, from the same committee, as follows:

The undersigned, a minority of the select committee to whom was referred an amendment to the State Board of Agriculture, dissent from the report of the majority of the committee, and beg leave to submit the following minority report, believing that the law of the State (see sec. 10 of an act approved February 17th, 1852, entitled "an act for the encouragement of agriculture,") contemplated the payment of the delegates, including the expenses of the State Board proper, for two meetings, from the State Treasury.

We therefore recommend that sec. 11 of the Constitution of the State Board be amended to read as follows:

That the State Board of Agriculture, by its President and Secretary, shall certify to the Auditor of State the actual expenses of the State Board proper and the delegates thereto in attendance, at the annual meeting in January of each year, for payment from the State Treasury as provided by law, and the officers and members shall be paid such compensation for their services as may be allowed by the Board.

The amendment if adopted, will not entail any additional expense upon the Treasury of the State Board, and the sum thus taken from the State Treasury will not exceed \$2,000 per annum, and as the delegates who attend the meetings of the State Board come here in the interest of the people of the whole State, it is but just that they should be paid

from the common treasury, and we can see no good reason for denying delegates the benefit of the provisions of the law of the State to reimburse them for their necessary expenses.

Respectfully submitted,

SAMUEL W. HOLMES,  
D. C. DONAHUE.

After some discussion, the motion to substitute the minority report for that of the majority, was lost, and the latter report was adopted.

I. D. G. Nelson offered the following resolution, which was discussed and laid on the table :

*Resolved*, That in the opinion of this Delegate Board it would be beneficial to the agricultural interests of the State that the next State Fair should be held at the city of Richmond, and that therefore the State Board is hereby instructed to hold the next State Fair at that place; *provided* said city of Richmond shall guarantee such rights and privileges as said Board may deem necessary.

A. D. Hamrick offered the following resolution, which was adopted :

WHEREAS, Our distinguished scientist and co-worker in the cause of agriculture, Dr. R. T. Brown, has been appointed to the honorable and responsible position of Chemist to the United States Department of Agriculture, at Washington, D. C., *vice* Antisell resigned:

*Resolved*, That, though we shall miss from our discussions the able advice and counsel of the Doctor, yet we are gratified to know so important a position has been conferred upon one who is in every respect worthy and competent to discharge its onerous duties.

Dr. A. C. Stephenson offered the following:

*Resolved*, That the State Board be requested to procure, if possible, cheaper railroad rates for conveying cattle and all other articles to the State and County Fairs, and that the roads be requested to give timely notice to their agents on the roads of all such arrangements.

*Resolved*, That in consequence of the heavy expenses of conveying and maintaining cattle, and hogs and sheep at fairs, and as an encouragement to so important an interest to the State, the premiums should be greatly enlarged.

After an animated discussion on the subject of encouragement to cattle and other stock raising, the resolution was made the special order for 2 o'clock P. M., and by consent the floor, at that hour, was granted to General Sol Meredith.

The Board then adjourned until 2 P. M.

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JANUARY 3, 1872.

AFTERNOON SESSION, 2 O'CLOCK P. M.

The Board re-assembled at 2 o'clock. Before taking up the special order, Mr. Jones asked leave to offer the following resolution :

*Resolved*, That we, the Delegate Board, extend to the State Board our appreciation of the manner in which they have managed our State Agricultural Society, and also for the kindness shown us since we have been with them.

Adopted.

The special order, being the resolutions of Dr. Stephenson, Gen. Sol. Meredith spoke at considerable length upon the points involved in the resolutions. He spoke in strong terms of the disparity between the premiums on horses and those on thoroughbred cattle. He said our agricultural societies in this State offered no inducement to promote the introduction and breeding of thoroughbreds. We were to-day retrograding, and could show less fine cattle in the State than ten years ago. He deprecated the system of offering large premiums for fast horses, and encouraging a propensity toward field sports and gambling. He was particularly severe upon the practice of permitting pools to be sold within the Fair Grounds. He also animadverted in strong language upon the grasping spirit of the great railroad monopolies which had absorbed our local railroad lines, and now

refuse to offer fair terms to persons having stock to ship to State and other Fairs.

Mr. Hamrick thought if the railroad companies were approached in the proper spirit, favorable terms could easily be obtained.

Mr. Poole corroborated Mr. Hamrick, and said there had been no difficulty experienced on this point.

Mr. Sutherland thought railroads should carry articles to the fairs free as a matter of policy. It would induce larger entries, increase the interest in the fairs, cause larger attendance, and thus the companies would be reimbursed for their liberality in largely increased passenger traffic.

Mr. Williams (Vice President Sutherland in the Chair) moved to strike out the recommendation for increased premiums on hogs, and spoke in support of his motion. He showed by reference to the premium list how the premiums, in gross, on hogs had last year been increased nearly five fold.

Mr. Burke opposed the motion. He regarded hogs as one of the chief sources of our wealth and prosperity. The premiums on hogs, he considered, were trifling when compared with those on other stock.

The amendment was agreed to, and the resolution as amended adopted.

Mr. Claypool moved to strike out from the list the premiums offered for Chester Whites, and distribute the amount heretofore appropriated to the premiums on that breed, *pro rata* among the others.

This elicited a warm discussion as to the relative merits of the different breeds, each having its champion.

The motion was finally lost.

Mr. John Fishback offered the following:

*Resolved*, That for the purpose of providing the necessary funds with which to pay the increased premiums, the Directors be requested to take into consideration the propriety of increasing the price of admission to the State Fair Grounds during the week of the Fair.

Adopted.

Mr. H. T. Sample offered the following :

*Resolved*, That we, the Indiana Delegate Board and State Board of Agriculture, respectfully memorialize the Legislature of the State, at its next session, to so amend and change the agricultural laws of the State that the Agricultural and Horticultural Societies of the State may own land for the use of said Societies, not to exceed one hundred acres, and personal property not exceeding \$50,000.

Adopted.

Mr. S. W. Holmes offered the following :

*Resolved*, That it is the opinion of the Delegate Board that the Legislature should, at its next session, make liberal provision for a thorough geological survey of the State, and the publication of the report thereof, together with the proper maps and plats, with a view to the development of the mineral and manufacturing resources of the State.

Adopted.

Mr. Conrad offered the following :

*Resolved*, That the State Board ask the Legislature to pass an act encouraging the importation of thoroughbred cattle into this State.

Adopted.

The Secretary laid before the Board the following :

"Special premium offered by S. F. Penticost, of Zionsville, Indiana :

"Best boar and three sows of any age or breed, \$20."

The offer of Mr. Penticost was accepted by the Board.

Mr. Thomas Dowling offered the following :

*Resolved*, That the Delegate Board, before separating, desires to express its high sense of the uniform kindness, ability and fairness, of the Hon. James D. Williams, President of this Board; and that in retiring from the deliberations of this and the present Board, he carries with him to his home our best and most heartfelt wishes for his happiness.

Adopted by a unanimous rising vote.

Mr. Taylor stated that a proposition had been made to

the Board by Hon. T. A. Hendricks, to furnish transportation to the Board for a visit to the grounds of the Indianapolis Agricultural and Horticultural Association, for the purpose of inspecting the same. As it was proposed to sell the old grounds, if they could be disposed of to advantage and others purchased on favorable terms, he thought the invitation should be accepted in order that the Board might be informed as to the advantages offered by the Indianapolis Association's grounds. He supposed the State Fair Grounds might be sold for a sum which would enable the Board to purchase and fit up new grounds, and still leave a handsome surplus. He therefore moved that Mr. Hendricks' invitation be accepted, and a committee of three be appointed to call upon that gentleman and ascertain at what hour it would be convenient to start upon the proposed visit.

The motion was adopted, and the Chair appointed Messrs. J. Higgins, D. P. Cobb and C. Taylor, as the committee.

Some interchange was had of the views of members upon the questions of seeding ground to clover and flax at the same time, and upon early and late plowing for corn. Upon the first question there was quite a diversity of opinion. Some had found that the flax so shaded the clover as to kill it. Others had been successful, and found the flax did not interfere with the clover to any greater extent than oats.

As to early and late plowing, the testimony was almost unanimously in favor of late plowing for corn, many giving it as their experience if the ground were broken up after vegetation had well started, say as late as the 20th of May, they secured perfect immunity for their corn crop from the cut worm. One gentleman had divided a field, plowing one-fourth in the fall, one-fourth on the 1st of May, and the remainder about the 20th. In sections plowed in the fall and early spring the cut worms destroyed the entire set, while in the half of the field planted late, only a few hills along the edge required to be replanted.

The Committee on Finance reported that they had examined the accounts and vouchers of the Secretary and Treasurer, and found them all correct. They had not had

time to compare the Secretary's order book with the premium list, as that test would require more time than could be given to it, even though they remained in session during the entire sitting of the Board; and therefore recommended that this part of the business be referred to the Finance Committee of the State Board proper. The report was accepted.

Mr. Smith, of Randolph, offered the following:

*Resolved*, That the premiums paid by agricultural societies generally upon speed and fast horses are too large, in proportion to premiums paid in other departments, and we recommend that societies discontinue making so much discrimination in favor of speed.

On motion, the resolution was made the special order for this morning at 8 o'clock.

Mr. Conrad offered the following:

*Resolved*, That it is hereby recommended that the by-laws of the State Board be so amended as to allow no compensation to delegates or members of the State Board proper, during the time of the sitting of the Delegate Board.

Laid on the table until after Mr. Smith's resolution shall have been disposed of.

#### AWARDS ON FIELD CROPS.

The following is the report of the Committee to award Premiums for field crops:

#### *President State Board of Agriculture:*

We, the committee appointed to award premiums on Field Crops, make the following report:

For the best five acres of corn—David M. Lear, of Grant county. Product 197 bushels, 22 pounds per acre.

For best acre of corn—Lafayette Goss, of Knox county. Product 132 bushels per acre.

For the best acre of corn grown by boy under sixteen years of age—Alfred Welton, of Knox county. Product 132 bushels per acre.

For best acre of red wheat—William Nogle, of Hamilton county. Product 39½ bushels.

For best acre of oats—Alfred Welton, of Knox county. Product 54 bushels.

For best acre of timothy hay—Alfred Welton, of Knox county. Product 9,048 pounds.

M. T. CARNAHAN,  
SAMUEL GILLILAND,  
E. A. OLEMAN.

On motion of I. D. G. Nelson, the resolution in regard to holding the next State Fair at Richmond was taken from the table, and after some discussion, on motion of Mr. Crim, was amended to read "Richmond and other cities of the State."

The resolution was discussed by Messrs Nelson, Mutz, Davidson, Hamrick, Poole and others, when the time arriving that was appointed to visit the Indianapolis Agricultural and Horticultural Fair Grounds, on motion, the Board adjourned for that purpose, to meet again at 2 o'clock P. M.

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AFTERNOON SESSION, 2 o'clock P. M.

Board met pursuant to adjournment, President Williams in the Chair.

The special order being the consideration of the resolution in regard to the location of the State Fair, Mr. Meridith having the floor discussed said resolution at some length, followed by Messrs. Taylor, Buskirk, Williams, Burke and Sutherland, when Mr. Holmes offered the following resolution as a substitute:

*Resolved*, That the State Board proper be and they are hereby requested to hold the Annual State Fair, for the year 1872, at such point in the State as shall offer and secure to the Society the greatest



amount of money, not less than the cost of fitting up and preparing the necessary accommodations for exhibitors, including the grounds upon which to hold the Fair, taking into consideration accessibility of the points competing for the location and the best interests of the Society.

Mr. Nelson accepted the substitute for the original resolution, when on motion, it was adopted.

A motion was then made to adjourn, pending which, the President made a few very appropriate and feeling remarks and the Delegate Board adjourned *sine die*.

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## SECOND DAY.

JANUARY 5, 1872.

The Board met at 8 A. M., in their rooms in the State House. The call of the roll showed all of the members present. The minutes were read and approved.

On motion of Mr. Jacob Mutz, the Board proceed to the election of officers.

For President John Sutherland and Joseph Poole were nominated. Mr. Poole declined, and Mr. Sutherland being the only candidate, the President was directed to cast the vote of the Board for him. Mr. Sutherland was therefore declared elected President for the ensuing year.

For Vice President Mr. I. D. G. Nelson was nominated, and there being no other candidate, the President was directed to cast the vote of the Board for him, and he was declared elected.

For Secretary Messrs. Joseph Poole, O. F. Mayhew, W. M. Davis, Alexander Heron, W. C. Smith, and W. H. Drapier, were nominated. Mr. Poole declined, and Mr. Mutz withdrew the name of Mr. Mayhew. A ballot resulted in a majority of all the votes cast for Mr. Heron, and he was declared elected.

Mr. C. Dickson being the only candidate for the office of Treasurer, he was elected by a unanimous vote.

For Superintendent Major J. J. Palmer, H. Keeley, S. F. Penticost, H. W. Caldwell and H. Wood, were nominated. On the first ballot Mr. Caldwell received a majority of all the votes cast, and was declared elected.

For Executive Committee Messrs. H. Caldwell, A. B. Claypool, L. A. Burke and William Crim were nominated and elected.

Mr. Sutherland, the new President, then took the chair, and briefly addressed the Board.

Mr. Hamrick, from the Committee on Fair Grounds, presented the following report :

**Mr. PRESIDENT:**—The committee to whom was referred the subject of buying additional land to add to our present Fair Grounds, have considered that subject and taken great pains in examining the various plats of ground offered, as well as the grounds adjoining our present Fair Grounds, beg leave to make the following report :

The only grounds available for fair purposes adjoining or present Fair Grounds are on the north, and are owned by the heirs of the Schurman estate, and are managed and controlled by Mr. Post, the administrator of said estate. Mr. Post, by the consent of the Court, has agreed to sell to our Board fourteen acres for the sum of \$1,500 per acre, amounting to \$21,000. This ground added to our present Fair Ground, in the opinion of your committee, will furnish ample room for all practicable purposes, and would be a handsome addition to our present eligible grounds.

The committee will report further that Mr. John Armstrong proposes to sell to our Board eighty acres of his farm west of Crown Hill Cemetery, in exchange for our present grounds. These grounds are undulating, and are interspersed with a beautiful growth of young timber, and are situated on or near the canal and Lafayette Railroad, and about one-fourth mile west of the Crown Hill Turnpike and street railroad.

• Your committee will further report an additional offer from Mr. H. R. Allen. Mr. Allen proposes to sell the Board sixty-five acres in exchange for our lands. These lands are situated a little north of west from our present Fair Grounds, and adjoining to and along side the canal and Lafayette Railroad, and about one-half quarter west of Crown Hill Turnpike and street railroad, with a large avenue running from the turnpike and street railroad to the proposed grounds. These grounds are handsomely situated, with a beautiful grove of live timber, are high and eligible, with a fine view of the city, and are susceptible of a high state of improvement.

Your committee will further report an additional offer to purchase our grounds for a given sum by the Hon. E. B. Martindale, of this city, one-fifth cash, the balance in four equal annual payments; deferred payments to be well secured.

The plats, maps, and the specific terms, have all been submitted, and are in the hands of your committee for the inspection of your honorable body.

Your committee have not felt at liberty to accept any one of the propositions or close a contract with any of the parties, but report the different propositions for your future consideration and final action.

The report was received, and the committee retained until February, Mr. Crim being substituted for Mr. Williams.

On motion of Mr. Poole, the Board proceeded to select delegates to represent it at the Convention at Washington.

Messrs. Joseph Poole, Thomas Dowling, A. B. Claypool, and A. D. Hamrick were nominated, and Messrs. Dowling and Claypool were elected.

Mr. Burke offered the following:

*Resolved*, That the President be and he is hereby requested to appoint two delegates to the annual meeting of the National Agricultural Association, which convenes in May next in St. Louis.

Adopted, and Messrs. Poole and Williams appointed.

Mr. Dowling offered the following, which was adopted:

*Resolved*, That the President appoint a committee of three members

of the Board, to be known as the "Committee on Railroads and Transportation," whose duty it shall be to confer with the railroad organizations of Indiana and elsewhere, for the reduction of passenger fares and rates on all articles intended for exhibition at the State Fair of 1872.

Mr. Claypool offered the following, which was adopted:

*Resolved*, That it is not right and just to give the Chester White an additional class over the Poland and Big Bone China, to compete for premiums; and that the separate class of Chester Whites be stricken from the premium list.

Mr. I. D. G. Nelson offered the following, which was adopted:

*Resolved*, That the Committee on Finance shall hereafter meet the week previous to the annual meeting of the Delegate and State Board to examine the accounts of the Secretary and Treasurer of the State Board, and report the result of that examination at the annual joint meeting of said Board.

Mr. Dickson presented his bond as Treasurer, which was accepted.

Mr. Burke offered the following, which was adopted:

*Resolved*, That the premium on the best twenty-five varieties of apples be paid to Mr. Crawford, there being no formal protest presented to the Board against the award of the premium.

Professor Cox gave notice of a proposition to fit up a basement room under the State House for storing his cabinet; and on motion of Mr. Crim, an appropriation of \$75 was voted to meet the necessary expense.

Mr. Caldwell offered the following, which was adopted:

*Resolved*, That when this Board adjourn it adjourn to meet on the 20th of February.

Mr. Poole offered the following:

*Resolved*, That a committee of three be appointed to solicit and obtain special premiums from the citizens of Indianapolis, to be awarded to exhibitors at our next annual State Fair.

Adopted, and Messrs. Poole, Mutz, Heron, and Crim appointed as the committee.

On motion of Mr. Nelson, the salary of the Secretary for the ensuing year was fixed at \$1,000.

Mr. Nelson also offered the following, which was adopted:

*Resolved*, That the per diem and mileage of the members of the Indiana State Board of Agriculture be \$5 per day, and that the Treasurer and Superintendent be paid \$200 each as salaries for the year 1872.

The chair announced the following standing committees:

On Finance—Messrs. Caldwell, Crim and Nelson.

On Fair Grounds—Messrs. Hamrick, Seward and Mutz.

On Premium List—Messrs. Mitchell, Bazler and Claypool.

On Rules and Regulations—Messrs. Davidson, Johnson and Burke.

On Unfinished Business—Messrs. Poole, Dowling and North.

On motion of Mr. Hamrick, the Board then adjourned to meet on the 20th of February next.

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FEBRUARY 20, 1872, 10 O'CLOCK A. M.

The Board met at their rooms in the State House, President Sutherland in the Chair.

The call of the roll showed the following members present: Messrs. Burke, Bazler, Seward, Mitchell, Mutz, Dowling, Hamrick, Claypool, Crim, Poole, Caldwell, Davidson and Sutherland.

The minutes of the last meeting were read and approved.

Mr. Poole offered the following:

*Resolved*, That \$6,100 be appropriated on Live Stock, \$2,000 on Agriculture, \$1,200 on Mechanical, and \$700 on Miscellaneous

Departments, to be distributed as premiums in each of said departments at the State Fair for 1872.

Adopted.

Mr. Poole moved that the \$1,100 added to premiums on live stock be distributed as premiums on cattle.

Mr. Seward moved to amend this by limiting the increase in cattle premiums to \$1,000. After some discussion by Messrs. Burke, Caldwell, Mutz and Poole, the amendment was lost and the resolution of Mr. Poole adopted.

Mr. Burke moved that a committee of three for each department be appointed on premium list.

Mr. Poole moved to amend by the appointment of four committees, to take charge of the entire business of revising the premium list. Adopted, and the following committees appointed by the Chair:

On Horses—Messrs. Poole, Mitchell and Mutz.

On Cattle, Hogs, Sheep and Poultry—Messrs. Claypool, Hamrick and Burke.

On Agriculture and Mechanics—Messrs. Crim, Caldwell and Seward.

On Miscellaneous and Fine Arts—Messrs. Dowling, Davidson and Bazler.

Mr. Poole offered the following, which was adopted:

*Resolved*, That the premiums on live stock to be awarded at the Indiana State Fair, to be held in 1872, be as follows: On horses, \$2,919; on mules, jacks, etc., \$482; on cattle, \$2,258; on hogs, \$815; on sheep, \$815; on poultry, \$150; and that the appropriation on Agricultural Department be \$2,000; on Mechanical, \$1,200; and on Miscellaneous and Fine Arts, \$700.

On motion of Mr. Claypool, the Board adjourned till 2 o'clock.

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#### AFTERNOON SESSION.

President Sutherland called the Board to order. The call of the roll showed all the members present, or on duty.

The report of the Committee on Horses, was presented by Mr. Poole, who read an anonymous communication from Marion county, urging the importance of offering greater encouragement to the breeding of heavier draft horses. The report was then read and passed upon by sections, and adopted. Sections 3 and 4 contain additional premiums of \$20 for best mare four years old, regardless of having been bred.

Mr. Claypool moved to add premiums for colts one year old and under two, for heavy draft.

Mr. Poole claimed it would be impossible to distinguish between heavy draft and roadsters or horses for general purposes.

Mr. Claypool contended that heavy draft horses were a class by themselves. He was sustained in this view by Mr. Burke.

Mr. Davidson disagreed with the views of Messrs. Claypool and Burke, and contended that it was often impossible to tell the difference between the various classes at an early age.

Mr. Mutz said the Board were not called upon to award premiums; that duty devolved upon the awarding committees. The Board had only to establish a consistent list. A limit must be fixed, and the Board could not afford to go on and amend the list to suit the views of all persons who might have special interests in certain classes.

On motion, the Board adjourned until to-morrow morning at 8½ o'clock.

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#### MORNING SESSION, 2D DAY.

WEDNESDAY, February 21, 1872.

The various committees on the premium list made their reports, (the changes and revisions of the sections in the

several departments are noted in the records, the unchanged portions remaining the same as for the year 1871.)

After the reports of the committees on premium lists and their adoption by the Board, Mr. Poole offered the following :

*Resolved*, That the purchasers and owners of booths, stands or other privileges at the State Fair, and all their assistants and employees, will be required to purchase tickets before entering the Fair Grounds, and no officer or member of the Board will be authorized or permitted to furnish tickets for said purpose.

Adopted.

Mr. Dowling, of the delegation to the National Agricultural Convention held at Washington, D. C., February 15, 1872, submitted the following report, which was received and ordered to be spread upon the records, together with a resolution of Mr. Poole that the newspapers of the State be requested to publish the same, and that the Board tender its thanks to the delegates for the able manner in which they had discharged their duties:

*To the President and Members*

*Of the State Board of Agriculture:*

The undersigned, Delegates to the National Convention of Agriculture and Horticulture, appointed by your Board, which assembled at Washington on the 15th of February, beg leave to make a brief written account of that first assemblage of those representing the interests of agriculture and horticulture.

The Convention was organized in the Department of Agriculture, (a large and commodious building erected by the Government in 1863,) by the selection of Dr. George B. Loring, an eminent farmer of Massachusetts, as presiding officer. This was a selection fortunate for the speedy dispatch of business. Dr. Loring made a President fit to preside over any assemblage of legislators in the world. He was prompt, courteous, and impartial in his decisions, just



such a man as every convention and legislative body should have to conduct its deliberations.

On calling the roll of States, delegations appeared from every State but two or three. In addition to this, several Horticultural, Pomological, and Fruit Associations were represented, to which was added representatives from several Agricultural and Labor Colleges in the various States. Taking the Convention as a body, it presented an imposing appearance in point of intelligence, worth and capacity. It most assuredly *represented* a class of our citizens which should be, if they are not, regarded as the highest and noblest type of the American people. Many of the delegates were practically farmers and planters—all of them, directly or remotely, connected with the great agricultural class of the United States.

While many subjects were discussed of general importance to the cause of agriculture and horticulture, the great interest appeared to be centered in the establishment of colleges to teach the theory and practice of these industries. Perhaps it would be difficult to create a higher motive for the effort of the Convention and those represented in it. The proposition most discussed by the Convention was the memorial to Congress asking a donation of one million acres of public lands to each State and Territory, the same to be devoted to the establishment of Agricultural and Labor Colleges. There was much difficulty in arriving at the best mode of disposing of these lands, if Congress made the appropriation as requested. It was argued that if disposed of, as under the act of 1872, by the issue of land scrip, that great loss would be sustained in its sale. On the other hand it was agreed that if the States took the lands in fee it would create an unnatural rivalry in their selection, and that the States or Territories in which they are situated would assume the right of taking them. The Eastern, Middle, and many of the Western States, having no public lands within their borders, thought that they would be placed at a disadvantage in this selection, and favored the plan of having them sold by the Government and the pro-

ceeds distributed *pro rata* amongst the States, in the ratio of a million acres of land to each State. It was thought best, however, to leave the plan of distribution an open question, on consultation with the friends of the measure in Congress.

A committee of one from each State was appointed to prepare a bill making a donation of these lands, or the proceeds thereof, to the various States and Territories, and to enlist in its favor such Senators and Representatives as they could reach by private conference. This committee, at the close of the Convention, met and appointed a sub-committee of five, who would remain in Washington for some weeks, inviting the co-operation of the members of both branches of Congress. The fate of this measure, with half the session already expired, it is quite impossible to predict. The more immediate and pressing measures of Congress—those which must be passed—are yet far behind, and this important measure, to secure agricultural knowledge to the young men of the various States, may be lost in the rubbish created by an early adjournment. This is the great fear of failure.

The friends of this land grant, for the purposes of a practical farming education, are particularly active at this time, for the reason that the road monopolies, governed by great and influential corporations, are fast absorbing the heritage which should be kept for the uses of education and settlement. There seems to be no end to the rapacity of this class of corporations. Congress, so far, has not been proof against their demands. Millions upon millions of their acres have disappeared annually to swell the dividends of those who live in distant States. If the people stand still and make no effort to secure them for that higher and nobler purpose of “diffusing knowledge amongst men,” they will be the authors of the fate which awaits their prosperity—ignorance, indigence and poverty.

There were several movements made by delegates from the North and South to ask Congress to invest the present Commissioner of Agriculture with the dignity of a Cabinet officer! It was defeated by commanding majorities each time. The delegation from Indiana had very great pleasure

in believing that the Commissioner of Agriculture had a position—which was not a political department in any sense—and that this position should be maintained. This opinion was largely shared by the Convention, a majority of whom thought the introduction of such propositions extremely inopportune.

There was a general wish expressed in the Convention that a National Agricultural Board should be organized, which should hold National Fairs on the migratory plan, each year. A committee was appointed to consider some proper plan for its organization. This, it was agreed, was now becoming a national necessity, and would be productive of great good to the country. It was designed to bring together the farmers of the East, North and West, and the planters of the South and the Gulf States, and by friendly interchanges of opinions and views, tend to remove those misunderstandings which have but too often prevailed in regard to their material interests and prejudices.

Respectfully submitted,

THOMAS DOWLING.

A. B. CLAYPOOL,

Delegates to National Agricultural Convention.

Messrs. Johnson, Davidson and Burke presented the report on rules and regulations, whereupon the admittance fee to the State Fair was discussed. Mr. Poole was in favor of raising it to fifty cents, and was willing to guarantee a full attendance. He felt confident he could run the Fair with a handsome margin for the Board at that rate. Mr. Seward seconded the motion. Messrs. Davidson and Hamrick spoke at length in opposition. Mr. Burke, from the committee, said they had considered the matter, and it was their unanimous opinion that it would be inexpedient to raise the price of admission. Twenty-five cents was enough to pay.

At least half an hour was consumed in the discussion of this question, which was finally settled by a compromise, suggested by Mr. Seward, the Board agreeing to make the rate of admission thirty-five cents, no half fare.

Mr. Caldwell wished to amend the resolution by requiring every person who remained on the Fair Grounds all the week, or a portion of the week, to pay the price of admission for each day he is present, unless he is in the employ of the Board. The amendment was adopted.

In the course of the discussion, a curious imposition was ventilated. It seems there is a class of men who come there with common teams and carriage horses, which they enter without exhibiting or intending to exhibit them, but occupy the stalls during the Fair without paying anything for it, taking up the room which should be occupied by *bona fide* exhibitors. An effort was made last year to collect something from them, but it failed.

Mr. Caldwell presented a resolution that all who occupy stalls and do not exhibit when called, shall be charged a dollar a day for stall rent. Adopted.

Mr. Poole presented the following resolution, which was adopted:

*Resolved*, That all exhibitors and their employes at the Indiana State Fairs will be required to purchase tickets, and no free tickets will be issued by the Board or its officers for said purpose.

Mr. Davidson presented a resolution appropriating \$200 to defray the current expenses of the Secretary's office. Adopted.

Mr. Johnson presented a resolution offering a premium of \$25 for the best collection of rolled or hammered plate glass manufactured in America.

Attention was called to the manufacture of glass in New Albany, and the resolution was adopted.

Mr. Nelson wished the appropriation of \$200 continued for essays in the horticultural department.

After some discussion, it was amended and carried at \$150.

An effort was made to reduce the number of complimentary tickets. Last year it was ten hundred and fifty. A proposition was made to reduce it to eight hundred. More than half of the members made a speech upon this question, in which the press was liberally discussed. It ended with

allowing the same number of complimentaries as last year—ten hundred and fifty.

Meeting adjourned.

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ROOMS OF THE STATE BOARD OF AGRICULTURE,  
AFTERNOON SESSION, FEB. 21, 1872.

The Board was called to order by the President. The call of the roll showed all the members present.

The chair announced the following appointments for the next Fair:

Horse Department—Thomas Mitchell.

Mechanical—William Crim and Benjamin North.

Carriages and Wagons, Sewing Machines and Furniture—  
A. D. Hamrick.

Hogs and Poultry—L. A. Burke.

Fruit—F. C. Johnson.

Miscellaneous—F. Bazler.

Amphitheater—Jacob Mutz.

Agricultural—S. Davidson.

Gates—H. Caldwell.

Cattle—A. B. Claypool.

Fine Arts—Thomas Dowling.

Mr. Hamrick presented the report of the Committee on Fair Grounds, recommending the sale of the present Fair Grounds and the purchase of a new location.

Mr. Hamrick spoke at some length upon the subject-matter of the report, advocating the sale of the grounds and the purchase of others in the immediate vicinity of Indianapolis. He thought it would be necessary to change the character of our exhibitions to some extent—to add something in the way of encouragement to science. He deemed

it advisable to hold and own a place near the city, but not to locate permanently here.

On motion of Mr. Nelson, the report was laid upon the table.

Mr. Dowling thought it not necessary that the Board should own any lands. He thought the time had arrived when the Board should divest itself of its incumbrances in the way of real estate, and throw itself upon the generosity of the people. He considered the itinerancy of the Methodist Church the strongest evidence of the wisdom of its founders. If there is a good thing to be told, send out your missionaries to the remotest communities to tell it. This fair is the missionary of agriculture. Send it around. The cities of the State are not now as they used to be. We can go to any of them and find conveniences and a welcome. In conclusion, he offered a series of resolutions, providing that the Board shall advertise for the sale of the present grounds by public sale to the highest bidder; that from the proceeds all claims due the railroad shall be paid, and the balance invested so as to yield not less than 8 per cent.; also, that the migratory plan be adopted.

Mr. Mutz spoke at some length in opposition to the migratory principle, and moved a division of the question.

Mr. North called for the reading of a communication, in the hands of the Secretary, from the Southeastern District Society. The communication recommends the re-organization of the Board, the sale of the present grounds, the purchase of the grounds of the Indianapolis Agricultural Society, and the permanent location of the Fair at Indianapolis, providing that the citizens of Indianapolis will contribute annually \$5,000, to be used in increasing the premium list.

Mr. Hamrick opposed the migratory plan, urging that the Fair should be located at the capital by reason of the superior facilities for reaching it.

Mr. Dowling favored the migratory plan. He said the Board had made more money every year the Fair had been

held away from Indianapolis, than during any year it had been held at this place.

Mr. O. P. Cobb, of Aurora, a member of the Delegate Board, was accorded the floor, and argued at some length in support of the proposition as submitted by the South-eastern District.

After a long discussion, the resolutions were acted upon separately.

The ayes and noes were demanded on the first resolution, providing for the sale of the grounds: the vote was unanimously in the affirmative.

The vote on the second resolution, providing for the offering of the grounds by sealed bids, the purchase money to be paid one-fifth in hand and the remainder in four equal annual payments, was unanimously in the affirmative.

The vote on the third resolution, providing for the migratory plan, resulted:

Ayes—Messrs. Burke, Bazler, Johnson, North, Mitchell, Dowling, Claypool, Crim, Sutherland, Nelson—10.

Nays—Messrs. Seward, Mutz, Hamrick, Poole, Caldwell, Davidson—6.

So the resolutions presented by Mr. Dowling were adopted.

The question of locating the State Fair for the present year was then taken up.

Mr. Mutz moved that the next Fair be held at Camp Morton.

Mr. Dowling presented a communication from Vigo County Agricultural Society, inviting the Board to hold its next meeting Fair at Terre Haute. They offer to spend \$4,500 in fitting up the grounds for the purpose.

Mr. Poole moved to amend by providing simply for holding the Fair at Indianapolis, in view of the fact that Camp Morton may be sold previous to the time of holding the Fair.

Mr. Mutz accepted the amendment.

The ayes and nays were called and resulted in its adop-

tion, only three members (Messrs. Dowling, Burke and Nelson) voting in the negative.

On motion of Mr. Poole, provision was made for supplying delegate members with complimentary tickets.

Mr. Johnson moved a resolution of thanks to Terre Haute for the invitation to hold the Fair at that city.

The Secretary read a communication from the Chief Signal Office of the War Department, asking that a committee of the Board be appointed to co-operate with that branch of the service.

On motion, it was resolved to appoint a committee as asked. The Chair appointed Messrs. Johnson, Dowling and Nelson.

A communication was read from Mr. Macy, stating that the right of way for the side track of the Peru road at Camp Morton had expired.

On motion, the matter was entrusted to the care of a committee consisting of Messrs. Caldwell, Crim and Mutz.

Mr. Mutz moved that the Board proceed to apportion the duties of members in the selection of awarding committees, gatekeepers, etc.

Mr. Poole moved to amend by providing that the members shall report the same number of committeemen and for the same purposes as last year. Adopted.

Mr. Caldwell moved an appropriation of \$200 for the use of the Superintendent in repairs at the grounds. Adopted.

The Executive Committee was, on motion of Mr. Mutz, directed to inquire into the expediency of building new power and agricultural halls.

Mr. Seward offered a resolution providing that the officers of the Board proceed at once to advertise for proposals for the sale of Camp Morton, and that the Board convene on Wednesday, March 21, to consider the bids received.

Mr. Dowling offered a resolution defending the official character of the late Secretary from the attack of Col. Loomis, and expressing the confidence of the Board in Mr. Poole's integrity. Adopted.



On motion of Mr. Poole, an appropriation of \$20 was made toward filling the ornithological case in the room of the Board.

On motion of Mr. Bazler, the Board adjourned *sine die*.

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MARCH 21, 1872.

The Indiana State Board of Agriculture met at their rooms.

In the absence of the President, Hon. John Sutherland, the Hon. I. D. G. Nelson was called to the chair.

The Secretary proceeded to call the roll. Fourteen members answered to their names.

The next business was the reading of letters from Messrs. Sutherland and North.

Mr. Sutherland wrote at some length, regretting his absence and giving an attack of erysipelas in the foot as the reason. He recommended the appointment of a committee by the Board to visit the different hotels and boarding houses for the purpose of ascertaining at what rates they would board visitors to the Fair. He advised procuring the rates in the form of a contract signed by hotel and boarding house keepers, which should be appended to the premium list. He also recommended the making of a similar arrangement with the railroads. The public would then understand exactly the expense of transportation and board incidental to a visit to the Fair.

Mr. Sutherland, in conclusion, made an earnest appeal to the Board in behalf of the *North Western Farmer*. He hoped that each member would not only subscribe for this agricultural organ before leaving the city, but would agree to write all or something of what he knows about farming for publication in its columns, and pledge himself to get as many subscribers for it in his neighborhood as possible. He thought Mr. Kingsbury should be sustained and encouraged.

Mr. Caldwell, from the Committee on Finance, made the following report:

*Mr. President and Members of the*

*State Board of Agriculture:*

GENTLEMEN—Your Committee on Finance, to whom was reported the unfinished business of the Finance Committee, appointed at the January meeting of the Board, beg leave to make the following report:

We have compared the premium orders redeemed by the Treasurer with the register of orders kept by the Secretary, and with the premium list, and find them correct.

There are some orders outstanding and remaining unpaid; and as there is a large number of old redeemed orders accumulated and on file that are getting to be somewhat cumbersome, your committee are of the opinion that the Board should procure a canceling hammer for the purpose of canceling the same.

H. CALDWELL,  
WM. CRIM,  
I. D. G. NELSON,  
Committee.

Report concurred in.

The Board then proceeded to the consideration of the revision of the premium list. There was a lively discussion on the hog question, in which much useful information as to the different kinds was given. But the interest of the morning session was centered in the discussion of buggy plows.

Mr. Mutz was opposed to giving a separate premium to a riding plow. He looked upon it as a new-fangled invention of no practical value, and was of the opinion that the inventor should pay for exhibiting it instead of having the State Board advertise it.

Messrs. Seward and Claypool took the opposite ground, on the principle that the State Board was organized for the encouragement of every labor saving machine.

Mr. Poole seconded them on the ground of gallantry and

humanity. He had seen ladies drive a reaping machine by the day. If a practicable or convenient riding plow could be invented another wide field would be opened for the sex. There was also a large class of infirm or crippled men who could use the riding plow to advantage.

Mr. Burke thought a great deal of time had been wasted in the discussion, and was opposed to a separate premium.

The question was put to a vote. Mr. Dowling was absent and the ballot was a tie—six and six. Mr. Nelson gave the casting vote in favor of the riding plow.

In the discussion of the resolution to take several newspapers, the fact transpired that the State Board does not take a single agricultural paper. One or two come to their rooms but they are not expected to pay for them. A list was presented to which objections were made on account of other papers of equal merit being omitted. It was finally decided to take the *North Western Farmer*, *The Country Gentleman*, *National Live Stock Journal*, *Rural New Yorker*, *Southern Agriculturist*, Louisville, Ky., and the *American Farmers' Advocate*, Jackson, Tenn.

The following resolution was presented by F. C. Johnson, and passed unanimously :

*Resolved*, That the delegates chosen to represent the Board in the "National Agricultural Congress," which convenes at St. Louis on the fourth Monday in May next, are instructed to invite said Congress to hold their next meeting at Indianapolis, and this Board will provide a room in which to hold said meeting, should this invitation be accepted.

Mr. Johnson made a motion to adjourn, before which it was announced that the bids for the State Fair grounds, which closed at 12 o'clock, would be open at 2 P. M., whereupon the meeting adjourned.

## AFTERNOON SESSION.

The Board met at two o'clock, Hon. I. D. G. Nelson in the Chair.

Bids for the purchase of the State Fair Grounds and other property of the State Board in this city, were received from four parties, as follows:

By A. C. Shortridge, J. A. Seaton, James W. Piercy, W. M. Jones, W. F. Black, Emily Birchard, \$121,000, one-fifth cash and balance in four equal annual payments, with eight per cent. interest.

By J. McLene, J. B. Cleaveland, William C. Smock and Ebenezer Smith, \$123,575, one-fifth cash and balance as above, with eight per cent. interest.

By E. B. Martindale, Horace R. Allen, J. Hermon Baldwin, Wm. H. Morrison, George B. Edwards and John S. Spann, \$101,650, payments as above.

By R. M. Cosby and H. H. DeWolf, two thousand and one dollars per acre, payment as above.

On motion of Mr. Burke the bids were laid upon the table.

Prof. Cox, State Geologist, asked an appropriation of \$100 to pay express charges on copies of his report sent away. A long debate grew out of the matter. The debate touched upon the circulation of Geological and Agricultural Reports separate and in one volume. Mr. Hamrick wanted Prof. Cox to have the privilege of printing two thousand additional copies of his Geological report apart from the report of the State Board of Agriculture.

Mr. Burke offered a resolution to have 2,500 copies of the Geological Report separate, which was tabled.

A communication from the Secretary of the Gosport District Agricultural Society regarding a fund in the Owen county treasury to be disposed of for agricultural purposes. The Board directed the Secretary to reply that it is the sense of this Board that the Gosport Society should have the money.

Mr. Poole moved that the resolution of Mr. Burke, in relation to binding the Geological and Agricultural Reports in separate volumes, be taken from the table. Carried.

Mr. Claypool offered the following:

*Resolved*, That the Agricultural and Geological Reports be bound in separate volumes.

Adopted.

A committee was appointed to fix a time and place and otherwise prepare for a trial of plows, etc. The committee consisted of Messrs. Seward, Bazler and Claypool, who made the following report:

MR. PRESIDENT:

Your committee, to whom was referred the consideration of having a trial of implements and machines used in preparing ground and the culture of crops, beg leave to report that they recommend a trial of such implements and machines, to take place at Indianapolis, commencing on June 10th, 1872, under the auspices of the Board—the machines and implements to be tested and the premiums offered thereon to be the same as those in sections 24 and 25 of the premium list, and subject to the same rules and regulations.

Concurred in.

Mr. Johnson offered the following:

*Resolved*, That County Societies are requested to offer the *North Western Farmer* as a premium at their next Fair.

Adopted.

Mr. Dowling, from the Committee on Railroad Fares and Transportation, made the following report:

MR. PRESIDENT:

The following Railroads have agreed to Half Fare for passengers to and from the Indiana State Fair, 1872. For stock, machinery and other articles full rates to the fair, to

be returned free on certificate of the Secretary that they have been on exhibition :

Terre Haute, Indianapolis & St. Louis.

Indianapolis & St. Louis.

Evansville & Crawfordsville.

Indianapolis & Cincinnati Junction.

Cincinnati, Indianapolis & Lafayette.

Terre Haute, Danville & Chicago.

Ft. Wayne, Muncie & Cincinnati.

C., C., C. & I. (Bee Line).

Louisville, New Albany & Chicago.

Jeffersonville, Madison & Indianapolis.

Indianapolis, Bloomington & Western.

Ohio & Mississippi, one-half rates for freight, three cents per mile for passengers.

Indianapolis, Peru & Chicago.

Pittsburgh, Cincinnati & St. Louis, (Pan Handle), and leased lines within the State. Pittsburgh, Ft. Wayne & Chicago, Logansport & Peoria, and Indianapolis & Vincennes full rates on freight to be refunded on presentation of freight bills with certificates of Secretary that articles have been on exhibition.

Mr. Dowling offered the following resolution :

*Resolved*, That the sealed bids for the purchase of the Fair Grounds of this Board opened this day, are not satisfactory, and that all and each of them be respectfully declined.

Which, after some discussion, was adopted.

There being no other business, the Board adjourned to meet on the Fair Grounds, September 30, 1872.

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ROOMS OF THE  
INDIANA STATE BOARD OF AGRICULTURE,

June 11, 1872.

Executive Committee met agreeable to call of the Vice

President, I. D. G. Nelson, in the absence of the President, and upon the roll being called, I. D. G. Nelson, (in the chair,) William Crim and A. B. Claypool, answered to their names.

Considerable business was laid before the Committee by the Secretary, for their consideration.

Mr. Nelson offered the following resolution, which was adopted:

*Resolved*, That the Secretary be directed to examine into the rights of this Board, to have certain streets opened by virtue of the title derived from William A. Otis, Dudley Baldwin and Henrietta H. Baldwin, to certain property now occupied as a Fair Ground, and to take such steps as he may think necessary to have said street opened in accordance with the terms and conditions of said deed, and report at the next meeting of this Board.

Mr. I. D. G. Nelson offered the following, which was adopted:

*Resolved*, That all matters pertaining to Power Hall, requiring improvements of whatever nature, be referred to Messrs. Crim and Seward, who are hereby authorized to make all necessary improvements in fitting up said Hall suitable for next exhibition.

On motion of Mr. Crim, the Secretary was instructed to solicit bids for printing the requisite number of posters and tickets for the next annual exhibition.

On motion of Mr. Claypool, the Superintendent was instructed to arrange the old Furniture Hall suitable to exhibit the carriage work in.

On motion of Mr. Crim, the Secretary and Superintendent were directed to confer with the proper authorities to have the water facilities extended to the Fair Grounds, for the purpose of having the dust kept down during the next Fair.

On motion, the Committee adjourned.

## INDIANA STATE TRIAL OF AGRICULTURAL IMPLEMENTS, AT INDIANAPOLIS, INDIANA, JUNE 10TH, 1872.

At the March session of the Indiana State Board of Agriculture, it was determined to hold a trial of implements used in the preparation of ground and cultivation of crops, at Indianapolis, commencing Tuesday, June 10th, 1872, under the superintendence of Messrs. Crim, Mutz, and Mitchell, Supervising Committee of the Board.

The following is a list of the implements and machines to be tested, with the premiums appended :

### SECTION II.

#### IMPLEMENTS FOR PLANTING AND CULTIVATION OF CROPS.

Best walking two-horse corn plow .....	\$10.
Best riding two-horse corn plow .....	10
Best one-horse corn plow.....	5
Best double-shovel plow .....	5
Best single-shovel plow .....	2
Best cultivator.....	5
Best two-horse grain drill.....	Diploma and 20
Best one-horse five hoes wheat drill .....	Diploma and 10
Best one-horse three hoes wheat drill.....	5
Best field roller.....	Diploma and 10
Best harrow.....	5
Best two-horse corn planter.....	Silver medal.
Best one horse corn planter.....	5
Best hand corn planter.....	2
Best one-horse corn drill.....	Diploma and 5
Best two-horse corn drill.....	8
Best lawn mower.....	Diploma.

#### PLOWS AND PLOWING.

Best plow for general purposes.....	\$20
Best arrangement for attaching three horses.....	5
Best plow for alluvial or muck soil.....	15
Best sod plow .....	15
Best hillside plow.....	5
Best gang plow .....	10
Best plowman.....	One Moline plow, by Moline Plow Co., Illinois.
Best stubble plow.....	10



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Best steel plow.....	10
Best cast iron plow.....	10
Best sub-soil plow.....	10
Best dynamometer.....	3

The plows to be tested by an actual trial with a dynamometer, the Board finding ground in which to make the trial, under the following

### RULES.

1. The plows to be held by the competitors, or persons appointed by the Committee.
2. Each plow shall open and plow four rounds, back furrowing; the last furrow to be not less than seven inches deep and thirteen wide.
3. In testing the draft, the same plowman shall hold the plow who did the trial plowing, the third and fourth rounds to be the test, which shall be of the size above indicated.

The following points will be considered by the Committee in determining the merit of the plows:

1. Gross draught.
  2. Weight of plows.
  3. Loss of power in overcoming friction.
  4. Net power required to cut and turn furrow slice.
  5. Width of furrow slice.
  6. Depth of furrow slice.
  7. Comparative draught.
  8. Simplicity of structure, materials, workmanship, durability and price.
  9. Superiority of work.
- Each plowman will find his own team.  
Plowing will be done by two horses, the plowman to drive.

Manufacturers of agricultural implements and machines were invited to be represented at the trial, competition free and open to all.

Committees of practical men were selected with great care by the Supervising Committee of the Board, to test the implements and award the premiums.

### ENTRIES.

For walking two-horse corn plow.....	14 entries
For riding two-horse corn plow.....	3 entries
For one-horse corn plow.....	3 entries
For double shovel plow.....	9 entries
For single shovel plow.....	3 entries
For cultivator.....	14 entries

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For two-horse grain drill.....	11 entries
For one-horse wheat drill, 5 hoes.....	5 entries
For one-horse wheat drill, 3 hoes.....	4 entries
For field roller.....	3 entries
For harrow.....	5 entries
For two-horse corn planter.....	5 entries
For one-horse corn planter.....	3 entries
For hand corn planter.....	1 entry
For one-horse corn drill.....	4 entries
For two-horse corn drill.....	2 entries
For lawn mower.....	2 entries
For plow for general purposes.....	15 entries
For arrangement for attaching 3 horses .....	5 entries
For plow for alluvial or muck soil.....	12 entries
For sod plow.....	13 entries
For hill side plow.....	1 entry
For gang plow.....	2 entries
For stubble plow.....	11 entries
For steel plow.....	7 entries
For cast iron plow.....	3 entries
For subsoil plow.....	3 entries
For dynamometer.....	1 entry

After three days of faithful attendance on the part of the Awarding Committees and of the parties mostly interested in the awards, the trial was brought to a satisfactory close at noon on the 13th of June. It can truthfully be said of the Committees that they used their best efforts and left nothing undone to give all the contestants a fair and honest exhibition, and there can be no doubt that the awards were made with equal fairness and honest judgment as to the merits of the implements exhibited.

This trial is a step in the right direction to fully carry out the object for which the State Board of Agriculture was created, "to promote and improve the condition of Agriculture, Horticulture, and the Mechanic and Household Arts." The awarding of the premium to agricultural implements without any test, as is too often the case, is simply a farce, and the late contest proves that the State Board of Agriculture are profiting by experience in having the late trial during the proper season, at the proper place, and tested by the right kind of men.

The annual trial of agricultural implements will probably become as important as the annual fairs.

There were nine entries for the special premium offered by the Moline Plow Company, of a Moline plow for the best plowman, and much skill was displayed by the contestants, viz.:

John Marvel, Royalton, Boone county, Indiana.

Benjamin Floyd, Richmond, Indiana.

E. F. Norwood, Wm. H. McCurdy, John Johnson, Noah Foltz and Jasper Warman, of Indianapolis.

Frank Games, Royalton, Indiana.

N. Faught, Clayton, Indiana.

After near three hours spent in discussing the merit of each contestant, with the acknowledged excellence of all, the premium was awarded to E. F. Norwood, of Marion county.

The contest closed with the specimens of sod plowing for the special premium of a sod plow, offered by Sol Beard, of the Lafayette Plow works, and was very appropriate for the close of such an exhibition. It was generally remarked that such perfect plowing never was seen, and could not be excelled.

The premium was awarded to B. Floyd, Richmond, Ind.

By previous arrangement, the awards on implements were not made known until the State Fair.

For awards of premiums on implements at June trial, see awards in regular list, Mechanical Department.



**PROCEEDINGS**

**OF THE**

**CONVENTION OF SHORT-HORN BREEDERS**

**OF THE**

**STATE OF INDIANA.**

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In March, 1872, a call, signed by the leading stock breeders of the State, was made for a Convention of breeders, in which the subjects of importing, breeding, feeding, exhibition at Fair, etc., could be fully discussed. May 21st, at Indianapolis, was the time and place designated by the call.

The Convention met in the rooms of the Indiana State Board of Agriculture, on the morning of May 21st, in obedience to the call.

Dr. A. C. Stevenson, of Greencastle, was called to the Chair, and made a short address, appropriate to the importance of the subject for which the Convention had been called.

J. G. Kingsbury was appointed Secretary, and Alexander Heron, Assistant Secretary.

On motion of General Sol. Meredith, a committee of five was appointed to select permanent officers.

The Chair appointed General Meredith, Charles Lowder,

J. M. Woodruff, John Higgins, and Claude Matthews such committee.

On motion of Mr. Matthews, Mr. J. H. Pickrell, of Illinois, and Mr. Hughes, of Kentucky, were invited to seats in the Convention.

The following resolution, offered by Mr. Matthews, was adopted:

*Resolved*, That it is the sense of this Convention that we enter into steps looking forward to the permanent organization of this Convention, and that a committee be appointed by the Chair to draft rules and regulations to govern this meeting, also to provide Constitution and By-Laws for our future government.

The Chair appointed as such committee C. Matthews, General Meredith, Charles Lowder, and Robert Mitchell.

On motion of Mr. Baldrige, the Chair appointed R. Baldrige, H. Cravens, Thomas Nelson, J. M. Woodruff, and John Giles a Committee on Order of Business.

Mr. Pickrell, of Illinois, and Mr. Hughes, of Kentucky, were, on motion of Mr. Matthews, added to the Business Committee.

On motion of General Meredith. Dr. Stevenson was invited to address the meeting at 2 o'clock P. M., to which hour the Convention then adjourned.

### AFTERNOON SESSION.

The Committee on Permanent Organization, by Mr. C. Lowder, Chairman, made the following report, which was adopted:

President—Dr. Stevenson, of Greencastle.

Secretary—J. G. Kingsbury, of Indianapolis.

Assistant Secretary—Alex. Heron, of Indianapolis.

In response to the request of the Convention, Dr. A. C. Stevenson, the President, addressed the Convention on the subject of the points of Short-horn Cattle, and the philosophy of the same, as follows:

## THE PRESIDENT'S ADDRESS.

GENTLEMEN: You constitute, probably, the first Short-horn Cattle Convention ever assembled; but, doubtless, the assembling of such Conventions hereafter will be frequent. A great interest to the country is to be subserved. The cattle of the country, their grazing and feeding, their influence upon land and commerce, may be well considered as of the most vital importance.

Short-horns may, with justice, be placed at the head of all the breeds of cattle for beef. The feeder and the grazier prefer this breed to any other, and the butcher is paying more money for them; while their large size gives them an important advantage over other breeds in being shipped to distant markets.

## POINTS OF CATTLE.

In view of this interest, now so greatly felt, we propose, at present, the consideration of the points of cattle and their *rationale*.

There are several breeds of cattle now much admired and very highly prized for both beef and milk, but lay high claims to good points. The Herefords are highly prized as beef cattle, with good points, are good graziers, and are red, with white faces—in size and style inferior, we think, to the Short-horns. The Devons are a beautiful small cattle, with good points; are good feeders, good milkers, the best working cattle, and of a deep-red color. These breeds may all be considered as approaching, more or less, the standard of points that we claim for a good Short-horn bullock.

The points of cattle might, with much propriety, be divided into two classes, direct and indirect; or such as present qualities directly to view, as the loin and back, thigh and rib, and those that are evidences of qualities not directly in view, as the touch, which is indicative of a tender marbled flesh and aptitude to fatten. The eye and the countenance are indicative of a quiet disposition and a good

temper, or the reverse, which has much to do with the feeding qualities of all cattle.

The butcher is interested in the direct qualities or points, as the back, loin and rib, which are of the most value in the shambles. The carcass must cut well into those choice bits that bring the most money. He cares nothing for eye or temper, or how much it may have cost to have prepared him for the hooks. The breeder takes a larger view. He adds to the qualities desired by the butcher all those requisites that make early maturity—good flesh and a disposition to fatten readily at any age. Hence, the head and its appendages, which are an abomination to the butcher, are points of the greatest interest to the breeder and feeder.

We now introduce to you, 1st—

#### THE HEAD.

“The head should be small.” This is a very imperfect description of the head, but in too many accounts all that is given. If the size of the head were all that was of consequence, a pound’s difference in any case would be of little consequence in the sale of a bullock. It is the *form* of the head that becomes of so much interest to the breeder. The head above the eyes should be wide, giving space for large cerebral development. The intelligence of an animal depends upon a well-developed brain and nervous system; upon which, also, so much depends the vigorous and healthy action of the organs of digestion and assimilation, the circulation and the vital functions generally. We have already stated that the intelligence and temper of the cow depends much upon a well developed brain. It will be found by observation, that most vicious beasts have small upper heads, and are large below the eyes. Again, the upper head should be wide, to give width to the articulations of the lower jaw. It is necessary that that part of the mouth where the food is masticated should be large, that the supplies required for the stomach may be well masticated, and remasticated in chewing the cud. There is another reason



for width at the base of the head and between the angles of the lower jaw. It is here that the very important passages have their entrance that supply food for the stomach and air for the lungs. Close at hand, also, is the important connection of the spinal marrow and the brain, to say nothing of many large and important blood vessels that find their way to the head. These considerations we think conclusive, as to the necessity of size of head in the cerebral portion.

That portion below the eyes, the face, should be comparatively small. Its principal office is to gather food and air. Thin lips and elastic nostrils are wanted.

The eyes should be large, bright and lively, and yet quiet. The physiognomy of the ox is as clearly indicative of his character as the character of man is written upon his face. And the reason that less is indicated in the face of the ox is because he has fewer vices, and has been guilty of fewer transgressions. A small dark eye, set in a dark circle, with a large face below and a narrow head above, will be found bad tempered, wild, and consequently a poor feeder. The circle around the eye should be of a bright yellow color; the nose the same. These considerations may seem trifles, yet this color is the result of a peculiar secretion; and the inference is a probable one, at least, that other secretions will be apt to resemble it in color. Hence, the secretion of milk will be apt to resemble it in color, and a bright colored flesh is betokened by these peculiar secretions as indicated in the color of the nose and circles about the eyes.

As a very large ear mostly indicates sluggishness, one of medium size is preferable. A bullock of fine organization will manifest very clearly his impressions in the movement of his ears. If he flees from danger his ears are erect, or a little inclined backward, that he may be the better warned of danger behind. If he is in haste to meet a kind master, who is bringing him a desired meal, the ear is presented forward.

We pass on to the horn, a member that seems of little use, unless as an instrument of defence and offence. The

ox does, indeed, so use it, as his superiors do the bayonet, to poke the sides of his fellows. Whether man has learned the art of war from the ox, or the ox from man, we will not undertake to decide; merely stating that we have often been sore perplexed with the master ox of the herd for placing himself across the gateway with horns presented, and signifying that no beast with lighter horns than his shall pass until it suits his pleasure; and this he never fails to repeat at every pass way. If horns must be had, those that droop much can do least harm, and might, on that account, be preferred. The horns should be clear, without black tips or any black marks whatever—some say of a waxy color. Some, again, claim that they should be flat in Short-horns. But these matters are, most of them, non-essentials.

We dismiss the head, after attaching it to the neck in its proper position—not at right angles, but at an angle of so many degrees that, with the under part of the neck it forms an arch. This gives a better throat and a freer passage to the food and air to stomach and lungs, and is graceful withal.

#### THE NECK.

The neck expresses far less to the breeder than the head and face. The neck should be just long enough to enable the taking of food easily from the ground. It should be strong and well muscled upon its sides, covering at its base the points of the shoulders well, and at its junction with the head it should be small and round, with its skin fitting it pretty much as a well-fitting stocking does the leg. The under line of the neck, with the under line of the jaw, should be circular, as already stated, at its junction with the head, and on its upper line it should be a little lower than the crops. A fine illustration of what we prefer may be seen in the head and neck of the *Duke of Northumberland* and in those of *Comet*. A thin, broad neck is sure to indicate weakness and poor feeding and fattening qualities. Animal having such may well be avoided as breeders.

## CONTOUR OF THE BODY.

The butcher and the breeder may now meet and consult profitably on the general contour of the body. Here the opinions of the former must be adopted, as he fixes the price of all "butcher's stuff." The ox of a given weight that will sell for most in market, possesses the points that must be adopted. These points are now, however, well established, and we have only to refer to them and notice the reasons on which they are founded. We proceed to name them before we give their *rationale*. In general contour the body should be nearly a square. The crops should be wide. The line of the back should be straight; the line of the belly nearly so, swelling a little behind the ribs; the flank low; the ribs barrel-shaped; the loins wide and the rump long and wide; the back should be wide; the thigh should be long and wide; the legs short and comparatively small, or at least not coarse; tail light; hair soft and fine. The color should be red or white, or a mixture of the two, as roan or pied.

As has already been said, the body should be nearly a square. The vital currents moving in short lines, are more effective than when moving in those of great length. The blood moving from the heart along very extended channels, flows with much less force as it recedes from the cause that set it in motion. The same is probably true of the nervous currents. The great vitalizing organs are located near the center of the system—a provision of nature by which the vital currents are shorter than under any other arrangement. Here is the heart sending out its great currents of arterialized blood in all directions, to supply and nourish all the members of the body. Sitting over it is that wonderful air machine, the lungs, receiving the entire venous currents: and immersing the whole in an atmospheric bath; by which they are so renovated and changed as to make the blood again fit for the heart's use, to which it is returned by the shortest possible route. These organs lie encased together, and never cease their operation, night or day. But just here in this great center, is another great vitalizer, of fully

equal importance—the stomach. Here the food is received and changed into chyle, which is at once thrown into the circulation, where its office of supplying the system is performed. Now, the nearer a body is compacted around these great vitalizing systems, the more effectual will be the supplies. Observation fully sustains these views. A very lengthy bullock never fattens so readily as a short one. The breeds of hogs with long bodies are known not to fatten so readily as those of short, square forms, as the Siamese and Chinese. The same is true of sheep, and also of the horse. And even in man—we rarely find a corpulent man that will measure “six feet six.” Obesity will generally be found under six feet. Health and vigor is equally confirmed by observation, as a result of the square structure. Longevity may also be claimed with the greatest propriety for the same structure. A bullock with a square frame will be sure to possess all the qualities of health and vigor, and will feed and fatten well, or better than a long one.

#### BROAD IN THE CROPS.

This gives a better back; but it is also evidence of a better rib beneath the shoulder-blade, giving greater width to the chest within, and consequently greater play to the lungs. This position of the top of the shoulder-blade enables the legs to be brought more gracefully under the chest beneath. There are some beasts whose fore-legs stand so wide apart that they very much resemble two straight sticks stuck into a large pumpkin. Such animals are considered awkward and inconvenient at least.

#### THE BACK SHOULD BE STRAIGHT AND BROAD.

The broad back affords the most valuable roasting bits, and will be the delight of the butcher. The straight back affords a better spinal column, and gives the proper space to the cavities beneath, which, as we have just seen, are occupied by the most important organs. A straight line also

gives to the ribs a more graceful as well as a more convenient attachment.

#### RIBS SHOULD BE BARREL-SHAPED.

The ribs rising well from the spine, giving to the body a round or barreled shape, gives much more room to the organs within—the heart and lungs—than there would be if the ribs descended in such a manner as to give a flat side. A beast with flat sides, and consequently a narrow thorax, will lack greatly in vigor and health, and all the essential qualities that constitute a good bullock. A bad rib gives poor space to the abdominal organs which lie immediately behind those of the chest, unless the belly is greatly sagged, which is generally the case, as nature frequently, to relieve one deformity, adds another.

#### THE LOIN SHOULD BE WIDE.

This is an interesting point to those who love choice bits and are willing to pay well for them. The butcher makes large estimates here, and is sure to suit liberal purchasers. But nature is ever true to herself, for here, as elsewhere, beneath a broad loin she has provided large space for important organs, as the bowels, kidneys, and the organs of the pelvis. The rump of a good Short-horn is a very nice point. The back should extend out straight to the setting on of the tail. The thigh should pass up to this point nearly straight, so as to make the junction a right angle. This point, in many beasts, will be found to be a circle, which is unsightly and causes a loss of prime beef.

#### THE LEGS.

The legs should be short. There are precisely the same reasons for objecting to long legs that there are to long necks or long bodies. Observation proves a leggy animal to be not so good a feeder as one with short limbs. The bone of the leg should be firm and smooth, and not too large. The legs should stand well under the animal, and

the hocks directly in line with the body, so that in moving the hocks will be well separated, or about as far apart as the hind feet. The fore-legs should be straight and stand well under the chest, that the animal may have an easy and free movement. The inner side of the fore-leg, as it passes the sternum, presents a beveled appearance, to bring the limbs to their proper position beneath. Upon the proper position of the limbs depends that ease and gracefulness with which a bullock should move. It may be thought of no consequence how a bullock moves so that he is able to get to the market; but be assured there is much in it, it evinces strength and health, which are indispensable in feeding. I have seen Short-horns carrying two thousand pounds and upwards, with limbs so perfect that their movements were as nimble as if they were carrying but a thousand.

#### THE TOUCH.

By this the butcher ascertains beforehand the quality of the flesh. By it the breeder ascertains the aptitude to fatten as well as the quality and quantity of flesh that the animal will carry. Of all the qualities of the ox, this is probably the most difficult to understand. It is the peculiar sensation of softness and elasticity that is produced by the pressure of the hand upon the different parts of the body. This sensation depends, in part, upon a large cellular development beneath the skin and between the muscles, and in part upon the muscular structure itself. The hardness of the smith's arm depends upon its muscular structure, adapting itself to the laborious duties it has to perform, whilst the arm in the man of leisure is much softer. It is, therefore, to the cellular and muscular tissue that this sensation of touch is to be attributed. It is very common to find a softening of the muscular fibre as an accompaniment or a precursor of disease that may mislead. The same may be observed in the aged of both man and beast.

What is "touch," or what is it to "handle well?" How

is it to be distinguished from that which portends bad health and old age? By its elasticity—its power to replace the parts when pressed—a springy sensation. Mellowness from disease has a sluggish feel and moves slowly under the hand; to a less extent, it is true, still something of the same that is manifested in the pressure of the fingers on a dropsical limb as compared with a healthy one. In the one the indentions replace themselves sluggishly, whilst in the other with a ready elasticity.

It will require much practice to become an adept in this knowledge. Still many useful lessons may be daily had by the examination and handling of one's own stock. Comparative handling will afford much assistance. Take those animals that are known to accumulate fat readily and largely, as the opossum or the bear, or any other known to take on fat readily, and you will find a peculiarly soft and mellow "touch." Those breeds of swine, as the Chinese and the Siamese, that are known to accumulate fat largely, as compared with some of the poorer woods breeds, will offer good and ready illustrations. But probably the most ready illustration will be found in man himself. All that class of persons disposed to corpulency will be found to have a soft mellow touch, whilst those disposed to leanness will be found rigid and hard. This may be readily recognized in the shaking of hands. A very delicate lady may sometimes be found to have a hard hand as well as a sharp tongue. Smooth, soft skins, will also be found belonging to this class of persons.

#### THE SKIN.

The skin should be thick, soft and elastic—fitting alike either a poor or a fat ox. A lean animal, with an inelastic skin stretched upon him, could not fatten for the want of space to expand in. But with an elastic skin he may be swelled to great dimensions in what seemed to be but a covering for his bones. The skin performs very important functions in the animal economy. It is not only a covering

for all the parts beneath it—a protector against cold and heat, and all external causes of danger—but it is the seat of a vast system of minute blood vessels and capillaries, of exhalents and absorbents. A vast nervous tissue centers here that renders the skin sensitive in the highest degree. The great vital worth and importance of the skin may be readily appreciated by any injuries done it. The rapidity with which extensive burns destroy life, may serve as a sufficient illustration. “Destroy my skin, and you shall have my bones also.”

#### THE HAIR

The hair should be thick and fine, forming a protection against inclemencies of the weather. It is not sensitive, and is, therefore, a proper shield to the whole body, and is an evidence of the wisdom displayed in the creation of this family of the animal kingdom; that its hair—its outer garment, against which all injuries must first come—should be without sensation—a complete coat of mail, injuries to which cause no pain. Fine hair is also an evidence of a finely organized skin, a skin exquisitely finished in its whole structure of minute vessels and tissues. A skin thus delicately organized, is also evidence that other organs are alike constructed. Nature, in all her parts, undoubtedly produces a correspondence, so that if one part is of a peculiar structure, either fine or coarse, other parts are apt to correspond. If a beast is found to have coarse, rough hair, the skin and flesh are apt to correspond. Parts seen may be considered indicative of parts not seen. I may be permitted to add, that in all the scrub cattle that I have grazed and fed, I have never found one with a fine coat of silky hair that did not fatten well and make a desirable bullock.

#### COLOR.

Short-horns are red or white, or these colors blended as roan and pied. Fashion, for the time, may make one or the other of these colors popular. This is probably so now with



the red color. It may be so of another color in a few years. In the old volumes of the English Herd Book, whites and roans greatly prevail; and from a slight examination we find the same true of the American Herd Book. Practically there is no advantage in either of these colors. The butcher in his choice is governed not by color, but by other qualities. In 1871 I sold a lot of fifteen Christmas bullocks, and the purchaser pronounced a white the best steer in the lot. The previous year, in a similar lot, a red was pronounced the best. Scientifically there is no advantage in dark colors. White is the poorest conductor, and therefore makes the best summer garment; it being, also, the poorest radiator becomes the best winter garment. It resists the summer's heat from without, and in winter best confines the heat of the animal within. We noticed last summer, in our annual visit among the Short-horns, that Mr. Alexander had lately purchased a light-colored Booth bull. Mr. Warfield, also, had a Booth bull of light color. And I remember in 1853, when at Mr. R. Booth's, he was breeding his cows to a roan bull who was running in the pasture with them, having his head graced with a British Royal Crown, in the shape of a broad board that set upon his horns and covered his eyes. This may have been of service in preventing undue attentions to the beauties of the herd, to the neglect of the more homely and older dames. A caprice that excludes all but the red color is injurious. It limits improvements and confines it to a limited portion of the breed. It encourages the use of inferior animals just to obtain a fashionable color, and rejects better ones because they are of a different color. There is, in consequence, great danger of deterioration of this noble breed of cattle as a result of such puerile practices. If the breed is to be kept up to its past high standard, the very best selections should be bred regardless of color, provided it is the one peculiar to the breed. We would admonish breeders and lovers of this noble race of cattle to give no encouragement to such departures; they are evil, and that continually.

## CAN SHORT-HORNS BE IMPROVED?

As readily as any other highly improved breed of animals. The nearer a breed has approached perfection (if there is any such state), the more difficult it will be to advance it. But we hold that this is not the case with Short-horns, notwithstanding that this seems to be the prevailing opinion. It has been held by high authority that the ancient Short-horns were superior to any of the present day. †

We think the following axioms correct. If these cattle are not susceptible of improvement, then the breed is perfect; and that perfection implies perfect uniformity. That this breed is not perfectly uniform does not admit of a doubt. If not uniform, then they are not perfect, and are susceptible of improvement just as any other imperfect breed of animals are. That they are no better now than they were a century ago is no proof that they are not susceptible of improvement. The proper inference is, that breeders have failed to adopt such a course as would accomplish it. And there are reasons palpable enough why breeders have thus failed. The great merit and the deserved popularity of the breed, commencing with the Collings, has been the prime cause. The great demand for them has been the cause of throwing upon the country all the bull calves, good and bad, as breeders; consequently many bad bulls have been used to the great damage of the breed as a whole. The high price paid for these cattle has turned all the breeders into speculators, and consequently few have sought and practiced the art of breeding; and the true test of value, which is the shambles, has been neglected. The price now is too frequently made the test of merit. Under such influences Short-horns are in great danger of deterioration; and the evil is sought to be remedied by increasing the prices, making new importations and the adoption of some new family. This can afford but little and uncertain relief.

The breeder must understand first what he wants. He must know what constitutes a first-rate Short-horn. Then.

the great principle is, that like begets like. Then he must select the best, and none but the best, as breeders. There is no herd of cattle, or even a family, but there are better and worse cattle in it. The best should be retained and bred, and in the course of thirty years' breeding, this will be a better herd than at the commencement. That these cattle are susceptible of improvement, there can be no doubt. We think this is demonstrated in the fact of the great variety of grades and qualities that are found to exist. There can scarcely two animals be found of like quality in all their points. One will be better in a certain point than the other, and worse in another; and an inferior animal may be better in a point or two than the most superior. There is a certainty that improvements may be made.

Gentlemen, I have finished my remarks upon the points of Short-horns. Permit me, before retiring, to congratulate you on the prospects that lie before you. You have in charge the most noble race of cattle in the world. That you will properly care for them and perpetuate them, I have no doubt. Conventions of breeders must result in clearing out all charlatans, who, if tolerated, would bring about a state of things which must result in a deterioration of this race of cattle. Our breeding must be conducted on correct principles if we would succeed in improving, or even in maintaining the present standard of Short-horns. No false pretenses can accomplish good. Our talks here will result in the exposure of error and the establishment of the true principles of breeding. You to-day stand in the front rank of the great cattle interest of your country. Upon you depends the improvement of its vast herds. Fifty per cent. in size may be added by the substitution of Short-horns, and probably fifty per cent. in value of meat. It is moreover, not only incumbent on you to change all the vast herds of cattle in the country, but it is your duty to fill with Short-horns the limitless grass plains that lie between this and the Pacific, and our northern and southern boundaries.

At the conclusion of the address a vote of thanks was

tendered the President, and the convention proceeded to an informal discussion of the paper, and Short-horn matters in general.\*

Mr. Charles Lowder expressed his approval of the description of the head, but would say that he never yet knew large horns on a good bull to turn downward, as the President recommended. Some people, however, favor small or fine horns, and condemn large strong horns, but he would say that the *14th Duke of Throndale* has very large horns.

Mr. Claude Matthews was among those who believed in strong horns, believing that the horn expresses the strength and vigor of the animal, and that those sires which had impressed themselves most strongly on their progeny, had carried good horns.

Mr. J. H. Pickrell, of Illinois, being called upon for an opinion, stated that committees, in their prejudice against horns, often discarded the best animals. But we do not want bulls all horns, and he did not like the horns of the *14th Duke of Throndale*, which he regarded as too large. He would not breed, however, to a bull with feminine horns. They should be large enough to indicate a strong masculine character.

Gen. Meredith, in the matter of horns, believed in the medium. He did not approve of too large horns, although he had seen the largest horns upon the best animals.

Mr. W. W. Thrasher declared there was more in the touch and handling than many were aware of. His attention was first called to the matter at a fair in 1854, when he served as one of the judges, when some seventeen heifers were brought into the ring looking very much as like as so many eggs, but in handling qualities were quite different. And from personal experience, he knew good handlers made better beef than hard handlers. As to color, he thought it all fancy. Had once a small horn bull, and did not like large horns; but since has had a bull with large horns and now

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\*We are indebted to George W. Rust, of the *National Live Stock Journal*, for the full report of the discussions before the Convention.  
—SECRETARY.

he likes them. So he thought the horn matter was to a great extent fancy. He could not adopt black noses though, nor spotted ones either.

Mr. Pickrell was not so clear about hard handlers not being good feeders, although they might make better beef.

Mr. Thrasher also had not had his mind settled on this point.

Gen. Meredith believed there was a great deal in handling—that those soft to the touch fattened more readily than the hard handlers, and brought higher prices everywhere. Many hard handlers thrived well, but in consequence of the discrimination against them in the market, it was not profitable to breeders to produce animals of this character. Persons buying animals for breeding purposes also discriminate against them, as the soft handling indicates high breeding. He had discovered no difference in the handling of animals of different colors. The feeding qualities, in his opinion, went with the handling, as a general rule, although there were undoubtedly exceptions.

Mr. Thrasher said that a good handler was always a good feeder, but he did not know that the same could be said of hard handlers.

Gen. Meredith said that in thirty years' experience, he never knew a hard handler to be a superior milker. There was, it was true, a great difference in the milking qualities of different families—some of them are the poorest and some among the heaviest. By making proper selections, the Short-horns can be relied upon for dairy purposes; after testing the matter for years, the Short-horn has been adopted as the best dairy cow in England. It is possible to unite high milking with high beef qualities, but it requires more food when in milk. He knew some families of Short-horns which gave more milk than any other cows in the country, which, when dried from milk, fattened as readily as animals bred for beef alone. He deprecated the milking of cows and feeding to the calves, as, for some reason weakening the cows to a greater extent than allowing the calves to run with them. His calves generally weighed eight hundred to

one thousand pounds at eight months of age, but his cows had to have rich pastures. In relation to common stock, Short-horns, at any age from four weeks to four years of age, would bring 50 per cent. more than common stock, on the same keep and with the same treatment.

Mr. I. N. Harris related his experience in milking Short-horns, fully coinciding with the previous speaker.

Mr. Mitchell believed the Ayrshire as superior to the Short-horn for dairy purposes, as was admitted all over England.

Gen. Meredith had reports from the Royal Agricultural Society, recommending the Short-horn as better than any other breed.

Mr. Mitchell was in England two years ago, and saw scarcely any Short-horns in the dairy. The cows in use were generally Ayrshires, except when great richness was desired, when the Jerseys were kept.

Mr. Pentecost had tried Jerseys and Short-horns and preferred the latter.

Gen. Meredith stated that he had no doubt of Mr. Mitchell's statement being true as regards those portions of Scotland and England which he had visited, but in the reports made from the consolidation of the results from all the counties, the Short-horns were recommended to the world as superior to all others for milk, dairy and butter. There might be *localities* where results had seemed to give the preference to other breeds.

Mr. Lowder stated there was an impression in the minds of some men, that Short-horns were worthless for milk and butter, and especially for butter; and there are some families of which this is true; and many who had been so unfortunate as to get these cattle, believe they have tested the milking qualities of the Short-horn, when they have done no such thing. But there are some families of Short-horns which are as good milkers as can be found in the world—as good milkers as the Ayrshire in regard to quantity, and to the Jersey in regard to quality. He had a cow which yielded twenty-two and one-half pounds of butter in ten

days; and this same cow fattened very quickly. The great drawback to the general introduction of Short-horns in Indiana, was the impression founded on the introduction of inferior stock, that Short-horns were not good milkers; and the public mind should be enlightened. The only claim of the Jersey was, the *quality* of the milk, not the quantity; the people will be worse humbugged on the Jerseys than on these inferior Short-horns. The Short-horns, as a class, are certainly good milkers; but he did not believe, as a class, they were among the very largest milkers; he believed the forcing system, feeding and pushing the calves, had a tendency to deteriorate their milking qualities.

In response to a question, the discussion ran into the question of calves.

Mr. Lowder had never spoiled a bull calf by overfeeding, and had understood that some of the best sires in the country had been pushed and forced from the commencement. But more bulls have been ruined by not feeding enough. Cows were frequently spoiled by overfeeding, and would not have more than one or two calves.

Gen. Meredith, in relation to breeding heifers, stated that if bred when from two to two and a half years old, they generally breed without reference to condition, but if allowed to run over too long, it sometimes becomes necessary to reduce them in flesh. He was a believer in breeding heifers at from eighteen months to two years—under two years if possible. [In reply to a question.] There is no advantage in turning a heifer which does not breed, to a scrub bull. His plan was, to reduce them to the lowest point possible, and then commence feeding; and as they commence to take on flesh, breed them. They can be made to breed just as grass starts, when they can not be made to breed at other times.

Mr. Pickrell usually breeds his heifers so that they will drop calves at thirty months, and in such a manner as to have calves come in spring and fall. As to feeding calves, he believed in feeding them—he does feed them; never had

but one bull and one heifer which were not breeders. He crowds them from the commencement forward. He believes in breeding them fat—the fattening qualities would not be enhanced in the offspring. Without this course of feeding the cattle would deteriorate. He turns his animals out at night in the summer, and keeps them up in the day-time. In the winter he reverses it. He feeds corn; and for calves cooks it. While milk has been a secondary consideration, the most extraordinary milker he ever knew was a Short-horn, and she had been forced from calthood.

Mr. Thrasher said Ayrshire were better *average* milkers, but when a Short-horn milker was found, she would prove twice as valuable as an Ayrshire. He never knew a good Short-horn milch cow which was not also a good feeder. In the matter of calves, he wanted them to eat all they would from the time they are born until they are bred. If young bulls were bred too often, it would injure them. He believed the best time to breed cows to be between Christmas and April; believing it more convenient in breeding, and having the calves come at best times; and cows are more likely to stand. By having calves come late in the fall, there will be less danger from milk fever, and calves are ready to go on grass in the spring. He believed in feeding food in the raw state. He believed also in feeding grain for the first six weeks while on grass, and until grass becomes more mature.

Gen. Meredith favored feeding raw corn to calves.

Mr. Thrasher opened up the matter of awards at fairs, showing the injustice of appointing persons as judges who have no experience, and no qualifications for their positions. These awards not only work an injustice to exhibitors, but they corrupt the public taste, and contribute to the formation in the public mind of erroneous models.

Gen. Meredith thought it a great mistake in turning off to grass too early with no grain. They will lose more in the first six weeks than they will regain before August.

Mr. Billingsley related his experience in feeding calves shelled corn.



Mr. Thrasher had his herd already at grass, and throws them out good hay every day, and they eat a great deal of it, which shows that the grass lacks strength, and that the cattle require something more.

Gen. Meredith expressed the belief that milk fever is occasioned by spinal difficulties. He never knew of a case but that the cow's tails were hollow, which shows that the whole spinal column is affected. If the splitting of the tail and treatment for spinal disease were neglected, fatal results would follow.

Mr. Woodruff wished to know whether the portion of the tail split ever had any bone in it, and whether it would come in afterwards.

Gen. Meredith stated it had had bone in it, and a gristly substance would come in.

Mr. Beeler had lost some of his most valuable cows from milk fever, but never lost any earlier than May or later than July. He had found the hollow tail, and practiced the same remedy practiced by Gen. Meredith, and found there was nothing in it. His cows were always in good condition.

Gen. Meredith reiterated his belief in the spinal column theory. The disease usually occurs within thirty-six or forty-eight hours after calving; but had heard of cases coming on five days after. When a case occurred, he felt the tail, and always found it boneless and soft. He splits it, and puts in salt and turpentine. Then bleeds from a gallon to a gallon and a half. The system must be relaxed, and he applies blisters on the spine, over the kidneys. He gives a pound of salts to a dose; and if that fails to work, he gives another pound; and if that does not do, he gives a dose of croton oil. Animals are in danger of relapse for two weeks after, and must be kept warm by ample bedding and blankets at night. He keeps the bowels open without purging for two weeks, and gives stimulating powders and light diet.

The President had had a bad case in which a cow was down when discovered, and he kept pouring cold water on her all day, at night put wet carpets on her, the next day poured water on her again, and the next day she was eating

grass. The same cow was afflicted again; but the same treatment was not resorted to, and the cow died.

Mr. Thrasher had been very unfortunate. Had noticed that it occurred only in the best milkers, and he believed that it was the result of a failure of the milk to go into the bag. Had a case in which the animal was down before discovered. It occurred to him that cold water would be good to subdue the fever, and applied it freely for hours, and the cow was eating grass. Had tried the same remedy in other cases with success. Had more faith, however, in preventives. Recommended taking cows off from grass, and withholding everything that tended to produce a flow of milk for some time. She should be kept well milked. He did not believe in hollow horn or hollow tail.

Gen. Meredith believed there was such a thing as hollow horn and hollow tail. But hollow horn could be cured without boring.

Mr. Thrasher thought hollow belly was the thing instead of hollow horn. [In answer to a question.] A cow once having milk fever, is most liable to it.

Gen. Meredith said cattle in high condition are more liable to hollow horn than others. Pour turpentine on the head where the horns join, and the disease will be cured.

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## SECOND DAY'S SESSION.

At eight o'clock A. M., on Wednesday, the Convention re-assembled.

On motion of Mr. Matthews, the names of delegates in attendance, were recorded as follows:

Boone County—John Higgins, J. F. Williams, Throntown; S. F. Pentecost, Zionsville.

Fayette—W. W. Thrasher, Groves Post Office.

Gibson—Robert Mitchell, Princeton.

Hendricks—Ward McCown, Dr. A. Furnas, Danville; Charles Lowder, Plainfield.

Henry—Thomas Willhoit, Mechanicsburg.

Howard—David Greeson, Dr. Hinton, Alto; Isaac Hollingsworth, Russiaville.

Johnson—J. M. Woodruff, Nineveh; J. W. Bice, Bluff Creek.

Madison—David Catron, H. Craig, Pendleton.

Marion—Fielding Beeler, Indianapolis; J. J. W. Billingsley, Spring Valley.

Parke—Perley Mitchell, Thomas Nelson, Annapolis; R. C. McWilliams, Rockville.

Putnam—Dr. A. C. Stevenson, A. S. Bryan, John W. Robe and James F. Stevenson, Greencastle.

Rush—Dr. I. N. Harris, Rushville.

Shelby—Samuel Cutsinger, Edinburgh.

Sullivan—John Giles, Sullivan.

Tippecanoe—Jacob Kirkpatrick, Sugar Grove.

Vermillion—Claude Matthews, Clinton.

Vigo—William Hall, Ellsworth.

Warren—J. A. Johnston, Poolsville.

Wayne—Rankin Baldridge, Hagerston; General Sol. Meredith, Cambridge City.

The Committee on Constitution and By-Laws submitted the following:

#### CONSTITUTION.

ARTICLE 1. The name and style of this Association shall be the Indiana State Association of Short-horn Breeders, its object to promote and perfect a more substantial understanding among the breeders of this cattle, and the farmers at large in the State of Indiana, in order to encourage the further improvement, breeding and dissemination of our cattle.

ART. 2. The membership of this Association shall be composed of all breeders of Short-horn cattle, and those interested in their breeding, importing and disseminating throughout our State.

ART. 3. All persons becoming members of this Association shall pay the annual fee of one dollar, for the purpose of defraying the expenses attached to holding our annual meetings.

ART. 4. The officers of this Association shall be elected annually by ballot, and shall consist of a President, Vice President, Secretary, Treasurer and an Executive Committee of three, together with the President and Secretary *ex officio*, all of whom shall hold office until their successors are elected.

ART. 5. There shall be held at some point within the State an annual meeting, to be held on the fourth Tuesday in May.

ART. 6. The President shall preside at all meetings, call such special meetings as may be deemed advisable by the Executive Committee, and perform all duties appertaining to such office.

ART. 7. The Vice President, in absence of the President, shall call meetings to order and perform the duties of President.

ART. 8. The Secretary shall keep a full and faithful record of all proceedings of each meeting, carry on the correspondence and keep the papers and books of this Association in good order.

ART. 9. The Treasurer shall take charge of all moneys belonging to this Association, pay out the same on orders drawn by the Secretary, signed by the President, and render an annual report to this Association assembled.

ART. 10. The Executive Committee shall, through the President, be empowered to call all special meetings that may be thought necessary, and prepare and publish a programme, for the action of the Association, at least eight weeks prior to each annual meeting, and select and appoint members of this Association to prepare papers and addresses to be read or delivered before the members assembled in annual session.

ART. 11. Any article in this Constitution may be altered

or amended by a two-thirds majority of the members present at any annual meeting.

CLAUDE MATTHEWS,  
CHARLES LOWDER,  
S. MEREDITH,  
ROBERT MITCHELL,  
J. J. W. BILLINGSLEY.

The report was concurred in.

Mr. Thrasher offered the following resolution :

*Resolved*, That this Convention request our Legislature at its next meeting to make an appropriation sufficient to purchase a full set of the English Herd Books, to be placed in the State Library, as books of reference for all cattle men of the State or States.

General Meredith moved to amend by appointing a committee to memorialize the Legislature for the purpose stated in the resolution.

The amendment was accepted and the resolution adopted; when the President appointed Messrs. Thrasher, Lowder and Meredith such committee.

The subject of grazing was then taken up and discussed at length.

Mr. Lowder alluded to the necessity of grazing becoming more general. The continual taking of crops from the soil tends surely to its impoverishment, and the impoverishment of the people. We should make a point of opening the eyes of farmers to the fact that they can make more money by grazing, and then they will begin to inquire what kind of stock can be grazed with the most profit. Then they will buy Short-horns, and not before.

Mr. Thrasher related his experience with blue grass pastures, which should be well treated and not overstocked; and the older it gets the better. A portion of the pasturage should be set apart ungrazed in summer, for use in the winter. The common stock of the country can not be grazed with profit in competition with Short-horns and their grades. It is a mistake to suppose that Short-horns require extra care. They can be raised profitably with the



same treatment that any prudent careful farmer devotes to common stock. And with the same keep, care and treatment, as common stock, Short-horns will make the most beef, and beef which will sell for more per pound, and make the farmer and grazier the most money.

The President expressed his high appreciation of the economic advantages of grazing to the country. Grazing preserves the land, while cropping exhausts it. The southern portion of his county, naturally the most fertile, had been mainly devoted to raising grain—the production of corn to be fed to hogs had, from its first settlement to the present time been the main feature of its agriculture. The northern portion, having fewer natural advantages, had been mainly devoted to grass, and presented to-day an unbroken succession of pastures. In the southern portion of the county to-day, the land can be purchased at from \$35 to \$40 per acre; while in the northern portion of the county, it is worth \$80; and this difference of price is mainly due to the difference in the condition of the soil in the two portions of the county resulting from the opposite systems of agriculture which had been pursued. And so it would be found everywhere when the aggregated results of years were presented for our consideration. And speaking of the grazing of Short-horns, the speaker observed that nothing could be farther from the truth, than the idea that there was a necessity of feeding Short-horns, summer and winter, on grain, and having them continually rubbed and curried. This treatment will pay those gentlemen who are rearing animals for sale for breeding purposes, because it presents their stock to customers in high condition, looking sleek and clean, and handsome, and in consequence, a higher price is obtained. But when farmers will be content with more moderate prices, such as will amply remunerate them for their trouble, risk and labor, such a course is not necessary. Short-horns bred for beef require no different treatment from other stock; and the best strains of blood can be used for this purpose. If he had any bull calves in the fall, which had not been sold, he made steers of them.

The grazing of common cattle was his principal business, and had been for a great many years, and he felt qualified to express an opinion on the comparative merits of Short-horns and common stock for grazing purposes. He had thoroughbred steers which sold for \$8.50, when the market for best common beef cattle was but \$6 per hundred, and sometimes 13c had been realized for his Christmas steers. He believed in raising Short-horns for the shambles, and knew from personal and extended experience, that it could be done with greater profit than raising common stock for this purpose. For a long series of years, the results of grazing Short-horns had realized profits fully fifty per cent. greater than he had been able to secure from grazing common stock on the same pastures; and the farmer who raised Short-horns for beef, had fully fifty per cent. advantage over his neighbor who raised common stock. In reference to grazing, he would say, that entire reliance should not be placed on blue grass. From years of observation he had found, that a pasture of mixed clover and timothy would, during the months of May and June, put more flesh on to cattle than blue grass; but he would not recommend this for later pasturage. The greatest difficulty encountered by graziers was the short pasturage from the last week in July till the first week in September; and if any one could discover a grass which would provide good pasturage during this period, he would confer a great blessing on the country. The best pasturage he had been able to provide for bridging over this gap, was red clover and orchard grass. The "English blue grass," as it was called in his part of the country, but which he believed was the perennial rye grass, was also very valuable at this time. Red top he had a very poor opinion of for any purpose. Care should be exercised in first turning cattle to heavy clover pastures. He first let them fill themselves on something else, and only let them have access to the clover for a few hours in the day; and was particular not to turn them in until the pasture was perfectly dry. After they had been accustomed to it, clover would do them no harm.

Gen. Meredith had found timothy of great advantage for early pastures, but for general purposes he regarded blue grass as the best of all grasses. Timothy exhausts the soil almost equal to grain, while blue grass enriches it. Clover, also, was beneficial to the soil. He liked clover pasture for a short time, and also clover hay, but it must be properly cured. Perhaps it was the most valuable and nutritious hay we have. Timothy was best for horses, and very good for cattle and other stock, but for cattle he preferred the clover. Red top he regarded as comparatively worthless. The earliest grass had very little strength in it; and he believed in feeding cattle a little grain when first turned to grass in the spring—believed in it, because it paid to feed it. Blue grass should not be over-stocked.

Mr. Thrasher said there was no danger of cattle being injured on clover pasture, if access could be had to a stack of dry hay or straw. He also alluded to the necessity of educating the agricultural mind to the economy of breeding and feeding Short-horns. It had been so educated on the hog question, that it was now rare indeed to see an "elm-peeler," which, years ago, were so numerous. And now we must address ourselves to the duty of educating the farmers also on the Short-horn question; for there is scarcely a greater difference between the improved breeds of hogs of to-day, and the "razor backs" of years ago, than there is between the Short-horns and the "pennyroyal" breed of cattle, to which many farmers adhere with such tenacity. He knew the difference from personal experience; and any person who would place Short-horns on any pasture, by the side of common stock, and subject them to the same treatment, summer and winter, would soon satisfy himself that there was more profit to be made in raising thoroughbred stock than any other.

The hour of noon having been fixed for an adjournment, in order to allow of members returning that day to their homes, the President admonished the Convention that it must bring its discussions to an end, although several of the

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topics which it had been intended to discuss had been scarcely touched upon, and address itself to business.

Mr. Lowder offered the following resolutions, which were unanimously adopted:

*Resolved*, That we recommend the Northwestern Farmer, published in Indianapolis, by J. G. Kingsbury, as worthy of the patronage and hearty support of all the farmers of Indiana,

*Resolved*, That we will use our influence to increase its circulation in our respective neighborhoods.

*Resolved*, That we believe it is a good medium for advertising our business, and that we will give it our support and patronage in that way.

Mr. Matthews presented the following:

WHEREAS, In view of the great benefit resulting to each and all of us, as breeders of Short-horn cattle, during this Convention, by the free interchange of thought and pleasant relations; it is, therefore,

*Resolved*, That it is the sense of this Convention assembled, that great good would result from a grand National Convention of Short-horn breeders of the United States and Canada.

*Resolved*, That we suggest the propriety of holding such Convention, and recommend it to the careful consideration of all breeders, at some central point convenient of access to the entire country.

*Resolved*, Also, that the Convention appoint a committee of three to correspondent with prominent breeders, where their addresses can be ascertained, and if this should meet the approval of a large number, that said committee be empowered to appoint a time and place of holding such National Convention as shall seem best to the committee.

General Meredith favored the resolution, and desired the resurrection of the National Agricultural Association.

The Chair appointed as the committee recommended by the resolution, which was unanimously adopted, General Meredith, Claude Matthews, and J. G. Kingsbury.

The election of officers was then taken up, and resulted as follows:

President—Dr. A. C. Stevenson.

Vice-President—Charles Lowder.

Secretary—J. G. Kingsbury.

Treasurer—Alex. Heron.

Executive Committee—General S. Meredith, John Giles, and W. W. Thrasher.

After a few moments spent in concluding the details of the meeting, the Convention adjourned, to reassemble on the fourth Tuesday of May, 1873.

It is safe to say that this Convention has been successful beyond the expectations of the most sanguine, and will be followed by a host of beneficial results.

# INDIANA STATE FAIR, 1872.

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## THE TWENTIETH ANNUAL EXHIBITION.

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### HISTORY OF THE FAIR.\*

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#### FIRST DAY.

MONDAY, September 30, 1872.

Yesterday, the Twentieth Indiana State Fair began, on the grounds of the State Board of Agriculture. For several weeks past, Superintendent Caldwell and a large force of men have been engaged in fixing up the grounds, for the reception of animals and articles entered for exhibition, and at times have imagined that the accommodations could never be exhausted, but as often they have proved to be deficient, and additional accommodations were ordered.

It was expected that, owing to the small premiums offered in the horse class of the Live Stock Department, but a portion of the old stalls would be in demand, but last night applications were in Mr. Hall's hands, the Assistant Super-

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\*Substance of Report from Indianapolis Daily Journal and Sentinel.

intendent in charge of horses, for twenty more stalls than are up, although 211 stalls in all have been provided—forty more than ever before. And so it has been in the other classes of the Live Stock Department.

Two hundred new hog and sheep pens have been built, and forty more are under way, and will be finished to-day. Superintendent Caldwell, although not ubiquitous, is as nearly so as possible, and with the force of twenty-five carpenters under his charge, will endeavor to arrange for the reception and accommodation of all entries that may be made.

#### THE ENTRIES.

Up to the opening of the Fair, more entries than ever before, had been made, and the opening day was a lively one for the entry clerks.

The Secretary's office was removed to the grounds early Monday morning, and the following gentlemen were appointed to take charge of the entry books:

Live Stock Department—John H. Batty and Dr. R. F. Bence.

Agricultural Department—George Ward and A. F. Davis.

Mechanical Department—Dr. G. M. Levette and Fred. Smith.

Miscellaneous Department—W. H. Weeks.

Special Premiums—Emmett Rose.

In addition to these, Mr. Heron is ably assisted by Mr. O. F. Mayhew, who has been in the office for fifteen years.

Last evening the entries in the several departments footed up as follows:

Live Stock.....	694
For Special Premiums offered on Live Stock.....	73
Mechanical.....	550
Miscellaneous and Fine Arts (about).....	300
Agricultural and Horticultural.....	435
For Special Premiums in this department.....	19
Total .....	<u>2,071</u>

On the first day last year the entries footed up only 1,442. The increase is a true exponent, too, of the improved character of the display this year over that of last.

THE STATE BOARD.

A meeting of the State Board of Agriculture was held yesterday afternoon, at which all the members were present save two. No business, of particular importance, was transacted. Some old business was closed up, and several matters pertaining to the management of the Fair discussed.

A proposition was made by the ladies of one of our city churches, to provide a voting booth, where persons could cast their votes for awarding a magnificent cake to their choice for Governor, the most popular gubernatorial candidate, as evinced by the votes, to be presented with the cake. The proposition was rejected by the Board, and every one will say they acted correctly.

During the Fair the Board will hold daily sessions, at which all questions affecting the rights and interests of exhibitors will be considered. Besides this, the members of the Board are charged with the supervision of the several departments of the exhibition.

This year the following arrangement has been made :

Horses and Mules—Thomas V. Mitchell.

Hogs—L. A. Burke.

Cattle—A. B. Claypool.

Sheep and Poultry—William Crim.

Agricultural—Stephen Davidson.

Mechanical—Benjamin North.

Horticulture—F. C. Johnson.

Gates—H. Caldwell.

Miscellaneous—F. Basler.

Carriages, Wagons and Furniture—A. D. Hamrick.

Amphitheater—Jacob Mutz.

Fine Arts—Thomas Dowling.

W. B. Seward—Charge of engines.

## THE EXHIBITION.

For the first day the exhibition in the several departments was unusually fine, notwithstanding the fact that in a few cases exhibitors desired and were granted the privilege of keeping their goods out until to-day, owing to the threatening appearance of the weather. As stated before, the exhibition of life stock in all classes is unusually fine. Mr. Hall, Assistant Superintendent, in charge of horses and mules, is in ecstasies over the general excellence of the stock under his charge.

Mr. Winters, of Tazewell county, Ill., is on the ground with the largest number of entries—eight horses and two mules; but one herd of seventeen horses was expected from Tetersburgh, Tipton county. The entries of Mr. Winters are for draft, carriage, and general purposes.

Allen Jackson, of Plainfield, has several horses entered for speed, which will make a creditable showing for time.

Lew. Caldwell, of Rush county, the owner of the celebrated five year old "Mila Caldwell," has also entered three horses for speeding.

Jim Wilson, of Rush county, who achieved a national reputation as a horse-raiser, has turned his attention to developing a high class of mules, and a span, seventeen and a half hands in height, now on the grounds, sufficiently indicates his success in this new line.

For the saddle horse premium, Messrs. A. C. and Gus. Shropshire, of Paris, Kentucky, entered the celebrated stallion "Black Eagle," of the "Gray Eagle" stock. "Black Eagle" is a beautiful animal, and is valued at \$5,000.

The cattle display has never been equalled in this State, and we doubt if ever excelled anywhere, and is a gratifying evidence that farmers and breeders are taking a deeper and more extended interest in the matter of producing fine breeds of animals. Herds are here from the farms of Pickerill, Macon county, Illinois; Moody, Petersburg, Kentucky; W. W. Thrasher, Fayette county, Ind.; Gen. Sol. Meredith, Cambridge City; Charles Lowder, of Plainfield, and others.

The animal which attracted the most attention was a short-horn Durham heifer, raised and owned by A. C. and Gus. Shropshire, Paris, Kentucky, which is valued at the enormous sum of twelve thousand dollars. She is a beautiful red animal, and is known as "Fanny Forester." She is called the renowned cow of the world, no animal of a like character approaching her perfection.

The display of hogs and sheep is incomparably the finest ever made in the West. The Poland China breed of hogs predominate.

Mr. Samuel Shields, of Paddy's Run, Butler county, Ohio, has eighteen head in pens, one of which weighs nine hundred and fifty pounds—the largest that ever entered the grounds.

In sheep, Mr. Thoms, of Canada, is the heaviest exhibitor, showing thirty-seven head.

Power Hall presents a busy scene. The machinery entered is of a widely varied character, and represents all sections of the country. As has been remarked of other departments, the display has never been equalled, owing, doubtless, to the largely increased premium list. The power is supplied by one of Greenleaf's new vertical engines, built expressly for the Fair. It is of seventy-five horse power, and a beauty in its construction. It is a novelty in this class of mechanics, and its smooth, easy manner of moving attracted much attention. The steam is supplied from two boilers, which are safely bricked over and stand outside the hall. All around Power Hall, the saw mills and other large machinery, to be operated by steam, is grouped and quite fills up the space devoted thereto.

W. B. Seward, a practical and careful machinist, is in charge of the steam machinery, and is about one of the busiest men on the ground.

It is in the agricultural implement line, though, that the grand display is made. Nearly one-quarter of the circle within the race track is already filled with farm machinery of various kinds.

Messrs. Crim and North, assisted by George W. Reeves, have charge of this department.

Floral Hall will present a beautiful appearance after to-day. It is being handsomely decorated by Anthony Wiegand, under the direction of Mr. F. C. Johnson. Besides these, floral displays will be made by August Lange, in charge of J. F. Hill's nursery; Weghorst and Mrs. Butcher, wife of a vegetable gardener, who enters a collection of fruits and vegetables; J. W. Reagan, Fillmore, W. A. and W. H. Reagan, Clayton. John Merrill, Hendricks county, and M. C. Dunlap, of Champaign, Illinois, will make displays of fruits and flowers. Mr. Dunlap is the largest nurseryman in Illinois, if not in the West, and his collection will be worth seeing.

Hon. Thomas Dowling, of Terre Haute, has charge of Fine Art Hall, which is being decorated by Mr. E. C. Mayhew, his assistant, and judging by the taste displayed in the arrangement of the few entries made yesterday, the hall will be exceedingly handsome.

Specimens of penmanship from Bryant & Stratton's Commercial College at this point, and the Terre Haute Commercial College, occupy a large space on the wall.

The display of fancy sign painting by T. V. Cook, of Indianapolis, attracted more notice than anything else. Such an elegant and handsome collection is not often seen.

Bowen, Stewart & Co. enter a case of goods dealt in by them, which contain several superbly bound books.

Messrs. Benham Bros., J. W. Bradshaw, and Charles Soehner have a full line of pianos and organs on hand, and the space devoted to musical instruments will be more than filled to-night.

John Woodbridge shows a case of chinaware and table cutlery, and Samuel Beck a case of arms of all sorts.

In Furniture Hall the display last evening was very meagre, although to-day it will be filled up, with probably the exception of the space devoted to sewing machines.

Several sewing machine agents are dissatisfied with the amount of space devoted to them, and those representing the



Florence, Wheeler & Wilson, Weed, Singer, Howe, and Grover & Baker, have agreed not to exhibit their machines. We are sorry for this action, but are of the belief that the Superintendent did the best he could under the circumstances.

The space vacated by them has been appropriated for the display of butter, cakes, jellies, etc., as the space in the Agricultural Hall is full to overflowing.

In the cross section of the hall, Messrs. Hildebrand & Fugate have a large and well selected display of hardware and cutlery.

In the Farm Products Hall, in charge of Hon. Stephen Davidson, the indications are that a very full display will be made. Several entries were placed on the shelves yesterday, but their owners could not be found.

For the accommodation of carriage and wagon manufacturers a new hall has been erected, and is nearly filled.

The Shaw and Lippincott Manufacturing Company, make by all odds the handsomest and best display.

This is a brief *resume* of the appearance of the halls yesterday. They will be spoken of more, in detail, during the Fair.

#### MISCELLANEOUS.

The attendance yesterday was unusually small—even for the opening day. This may have been because of the unsettled appearance of the weather, but more probably because none but exhibitors could be interested to any extent by the display. The attendance, on the whole, during the week, will certainly be the largest in the history of the Board.

The water works are a success. Mr. Rouse was busy fixing the connections between the drinking stand and tanks yesterday, and now one hundred and twenty-four thirsty souls can be accommodated at one point at once.

The Board are entitled to the thanks of the visitors for this precaution for their comfort, and doubtlessly they will receive them. From and after to-day, the sprinkling carts

will be in operation, and the dust will not have any sort of a show.

Entries can be made at any time during to-day, until six P. M., at which time the books will be closed.

The programme for the day is the continuation of entries; 2 P. M., the best double trotting team, premium \$50; second premium \$25; at 3 P. M., exercising fast horses in the ring.

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## SECOND DAY.

TUESDAY, October 1, 1872.

The second day of the Twentieth Indiana State Fair was a great improvement over the opening day—a clear, crisp, beautiful day, and the display on the ground was a corresponding improvement over that of the first day. Favorable weather brought out exhibitors, and all day long the clerks in the Secretary's office were busy recording them on the books, and even when daylight faded on the scene their labors in that line did not cease. The clerk's named, however, were not the only busy ones on the grounds. Superintendent Caldwell and his force of carpenters worked faithfully to provide accommodations for the entries, in the live stock department especially, but notwithstanding the fact that all the available space was covered with pens and stalls, the cry came up last night—more, more. Such a rush in the live stock department is not only unprecedented, but entirely unlooked for. One-third more than the usual number of entry-cards had been provided. They were exhausted the first day, and five hundred extra followed their course yesterday.

## THE ENTRIES.

Although the time for making entries was up at six

o'clock last evening, the books are not nearly posted yet, simply because of the utter inability of the clerks to record the entries as fast as applications were made. All day long the streets leading to the grounds were thronged with vehicles of all sorts bearing articles for exhibition. We learn from Mr. Caldwell, Superintendent, that several car loads of stock, intended for entry at the Fair, are yet on the Junction road, not delivered in the city.

The following were the total number of entries, in the several departments at six o'clock last evening. The full number can not be ascertained until to-night:

Live Stock.....	1,141
Mechanical.....	825
Miscellaneous and Fine Arts.....	402
Agricultural and Horticultural.....	07
For Special premiums.....	239
Total.....	3,314

This number is three hundred and seventy-eight more than on the corresponding day of last year, when they were closed for the Fair, while it is expected that those to be made to-day will swell the number to nearly 4,000.

#### THE EXHIBITION.

Attendants upon the Fair for the last dozen years can not fail to notice the changes in the character of the exhibition this year from those preceding it. The display of live stock overshadows everything else, while machinery (outside of agricultural implements) which used to preponderate, now makes but a poor show. Mr. S. F. Pentecost, Superintendent of the cattle, hogs and sheep, has his hands full, yet was not so busy yesterday that he didn't have time to remember the reporters, and it is to him we are indebted for the following list of prominent entries in his department, which will show the character of the display made. The list does not include any of which mention was made yesterday:

Hogs—Clay & Houston, Paris, Kentucky, twenty-eight

Berkshires. These pigs are of the same breed, and include some of the specimens, with which this firm took the grand sweepstakes premium of \$1,000 at the Chicago Swine Exposition last fall, for the best twenty pigs.

Armstrong & Bro., Indianapolis, twenty head of Poland China. This breed largely predominates this year.

I. N. Baker, Thorntown, twelve head Berkshire.

W. O. Reveal, Clermont, twelve head Poland China.

R. G. Haworth, Liberty, twelve head Poland China. These hogs are from one township in Union county, which contributes fifty-six head of fine hogs.

Nathan Hammond, Greencastle, twenty head of Poland China.

R. Baldrige, Hagerstown, Wayne county, twenty-seven head Poland China.

W. M. Moore, Covington, Ind., six Chester Whites.

Job Rogers, Clayton, twenty Berkshires.

Joseph Kennedy, New Elizabeth, nine Berkshires.

S. F. Pentecost, Zionsville, three Essex, one Berkshire and eight Poland China.

Henry Comstock, Liberty Mills, Wabash county, twenty-one head Poland China.

James Mustard, Indianapolis, thirteen Poland China.

D. McClintock, Selano, Ohio, eighteen Chester Whites.

G. W. Byers, Nevada, Ohio, eighteen Berkshire, two Essex and twenty-four Shortfaced Lancashire. These last hogs are very curious in appearance, on account of the short upward turn of their snouts, and attract much attention.

Samuel Thoms, Canada, ten Berkshires.

E. R. Moody & Co., Eminence, Kentucky, four Chester Whites and six Yorkshires.

Drook & Ward, Liberty, twenty-four Poland China.

T. E. Paddock, Liberty, sixteen Poland China.

J. A. Heavenridge, Liberty, nine Poland China.

J. L. Winter, Tazewell county, Illinois, thirty-one Poland China.

T. P. Forsyth, Franklin, ten Poland China.

T. W. Scobey, Mt. Carmel, twelve Poland China.

McCoy & Spahr, Centerville, twenty Poland China.

Clay Dawson, Lafayette, fifteen Poland China.

McGee & Brown, Lafayette, twenty Poland China.

John Tarlton, of Indianapolis, exhibits a pen of four-months old pigs of McGee Cross, which are very handsome. T. E. & O. Paddock, of Union county, have eleven pens of Poland China, one of which—"Billy"—weighs nine hundred and fifty pounds.

J. Pursell, of Johnson county, has four pens of Poland China, including one which weighs eight hundred and fourteen pounds.

Thomas Coats, of Hamilton, Ohio, exhibits some fine Chester Whites.

Last night the number of hogs on the ground was something over twelve hundred and more coming.

Sheep—George F. Morgan, of Elyria, Ohio, thirty Cotswolds, six Leicesters.

Thomas Taylor, Waynesville, Illinois, eighteen Merinos, six Southdowns.

Ensminger Bros., Danville, twenty-seven Cotswolds.

Thomas Willhoit, Middletown, eight Merinos.

John Middleton, Eminence, Kentucky, fourteen Southdowns.

Samuel Thoms, Canada, fifteen Southdown, twenty-three Leicesters and Cotswolds.

Robert Smith, Greenfield, six Southdowns.

W. E. Hartsock, Indianapolis, five fat sheep.

A. W. Willey, Augusta, six fat sheep.

G. P. Kunse, Mexico, Ind., six very fine Cotswolds.

Zigler & Banks, Laporte, twenty Merinos.

Drook & Ward, Liberty, seven Cotswold lambs.

General Sol. Meredith, Cambridge City, seven Southdowns.

S. K. Fletcher, Indianapolis, twenty Southdowns.

Cattle—S. F. Pentecost, Zionsville, two Durham cows and Alderney bull.

J. M. Williamson, Durham cow.

S. K. Fletcher, Indianapolis, three Ayrshire bulls.

General Sol. Meredith, Cambridge City, one herd of eleven Durhams.

H. Pearson, Greenwood, two fat steers.

They are the largest on the grounds, weighing three thousand, and two thousand seven hundred pounds.

W. W. Thrasher, Connersville, one herd of nine Durhams.

Thomas Willhoit, Middletown, one herd of eight Durhams.

H. Sandusky, Vermillion county, Illinois, one herd of ten Durhams.

Ed. Bedford, Paris, Kentucky, one herd of seven Durhams.

J. H. Pickerill, Harristown, Illinois, one herd of fourteen Durhams.

J. C. Jenkins, Petersburg, Kentucky, one herd of eleven Durhams.

H. Allison, Greencastle, Durham bull.

W. W. Allen, Greencastle, Durham bull.

Edward Isles, Illinois, eleven head of Durhams.

A. C. Stephenson, Greencastle, eight head of Durhams.

A. S. Bryant, Greencastle, seven head of Durhams.

J. M. Comstock—Alderney bull.

Trotter & Christy, New Winchester, three fat steers—Durhams.

They are known as the "triplets," and weigh something over seven thousand pounds in the aggregate. They will be on exhibition from and after to-day, on the ground.

J. L. Shorthose, Danvers, Illinois, two fat steers and cow—Durham.

J. L. Fisher, Southport, Durham bull and cow, and Alderney bull.

Thomas Coats, Mt. Airy, Ohio, five Devons.

S. E. Jackson, Tipton county, yoke work cattle.

C. R. Laws, Indianapolis, yoke work cattle.

These are but the principal entries in point of numbers and quality. The aggregate number of stock on the grounds is nearly two thousand.

The horse stalls are all filled, and last night several horses slept "out." Yet Mr. Hall, superintendent of horses

and mules, assures us there is a car load or two more to come. Where he would put them, he had n't the slightest idea.

The display in this class is pretty well divided, but draft horses are the most numerous.

R. L. Cornthwaite, of Wayne county, has the largest span of draft horses ever exhibited on the State Fair grounds. They are five years old, and weighed respectively one thousand seven hundred and eighty-four, and one thousand eight hundred and forty pounds.

In the poultry line a very full showing was made, and the entries all indicated a high degree of breeding. What is more gratifying than anything else, is the fact that a large portion of the entries were by Indianapolis amateurs, and they do not suffer in the least by the comparison with the entries of breeders from other points.

E. C. Garlick, W. H. Fry and J. H. McKernan make the heaviest displays; they are of the Cochin and Brahma varieties, exclusively.

F. P. Becker enters six gold lace bantums—a beautiful sight.

W. F. Christian enters six cages of various breeds.

The accommodations for poultry were overrun, nearly as many cages being out of the house as in it.

The display of live stock, on the whole, has probably never been equalled in the West, and the holding of a National Exposition of Cattle and Swine on the same grounds, is almost assured by reason of this manifestation of the deep and general interest taken by the farmers in what so nearly concerns them as a stock-raising people.

## THE INSIDE DISPLAY.

### ART HALL.

The display in this Hall is very fine, and attracted more attention than any of the other departments. The exhibitors are as follows:

- John Woodbridge & Co.—Glass and queensware.  
National Watch Company—A case of Elgin watches.  
B. A. Steinhauser—Paper boxes.  
Todd & Carmichael—Books and stationery.  
Benham Bros.—Musical instruments.  
Eddy & West—Gentlemen's furnishing goods.  
Daggett & Co.—Confectionery.  
Bryant, Stratton & Co.—Penmanship.  
Braden & Burford—Lithographs and stationery.  
Terre Haute Commercial College—Penmanship.  
J. L. Winters, Illinois—Oil paintings.  
Cadwallader—Photographs.  
Fowler—Oil paintings and photographs.  
R. L. Shilling—Trunks and valises.  
L. D. Judkins—Photographs.  
Refining and Manufacturing Company—Oils, lamps and chandeliers.  
G. C. Steinhauser—Boots and shoes.  
Mrs. G. W. Brewer—Ornamental hair work.  
Casper Fuchs—Wood carving.  
Mrs. J. F. Huddart—Wax flowers.  
Mrs. S. T. Hensel and W. H. Reed—Ornamental shell work.  
F. J. Jones—Fly brushes.  
Brady & Blunch, Davenport, Iowa—Window shades.  
Beck & Son—Rifles, pistols, shotguns and revolvers.  
R. R. Parker—Men's furnishing goods.  
T. V. Cook—Signs.  
D. R. Clark—Photographs.  
J. M. Dennis—Oil paintings.  
Lieber & Co.—Oil paintings.

## FLORAL / HALL.

Pen can not describe the beauty of the display which is to be witnessed in this building. The colors of the flowers are so vivid, and delightfully interblended, their perfume so intoxicates the senses, that we are borne back in dreams to the gardens of Semiramis. Here flames the queenly rose,



and there shines the white, gold-hearted lily. There are to be seen hyacinths, dahlias, fuschias, cacti, geraniums and unnumbered other plants, their green rich leaves contrasting vividly with the scarlet, purple, yellow and creamy blossoms.

There is also a large collection of grapes, peaches, apples, pears, apricots and other fruits, tempting to both eye and palate.

In the center is an immense pyramid of flowers and plants, surmounted by a beautiful evergreen, arranged by August Lange, who has charge of the floral department. Around this, and also on the sides of the building, the collection of plants of Henry Weghorst, Mrs. G. W. Butcher, Mrs. Andrew Wallace, and Anthony Wiegand, all of this city. The display of the latter is the largest in the hall, and is far superior, in beauty and excellence to any heretofore made.

Cut flowers are here in profusion. Especially worthy of attention are the bouquets, both round and flat, entered by Mrs. J. W. Ragan, and Misses Belle and Amy Ragan, of Fillmore; Mrs. W. A. Ragan, Clayton; Miss Hattie Moore, Greencastle; Mrs. C. A. Howland, Indianapolis, and Mr. Heintz, of Terre Haute.

On the other side of the hall, a magnificent display of beautiful, luscious fruits of all kinds, is seen. Among the larger exhibitors are W. A. & W. H. Ragan, Clayton, who have one hundred varieties of apples, and about thirty each, of grapes, peaches and pears; J. W. Ragan, of Fillmore, apples, exclusively—a good collection; Wm. Patrick, Terre Haute; A. Ward, Anderson; John Ott, Rockville; E. Bradley, Laporte, and M. L. Dunlap, Champaign, Ill. The latter has, by far, the most extensive display. In specialties are the following: Col. Willey, Clarke county, Indiana, peaches, fifteen varieties; Nicholas Ohmer, Dayton, Ohio, quinces—the finest display ever seen on the grounds; C. A. Howland, Indianapolis, pears, about a dozen varieties; Henry Mankedick, Indianapolis, grapes—an extraordinary show; Amos Thornburg, Mooresville; W. B. Thompson,

Monrovia, and Charles Lowder, Plainfield, all have large and well selected displays of apples alone. In all there are over 2,000 plates of fruit—the largest and finest display ever seen in the State.

#### MISCELLANEOUS HALL.

This department presents extraordinary attractions to the sight seer. The display includes almost every conceivable and inconceivable object, which it is in the power of man or woman to fashion with hands. The following is a list of the principal exhibitors:

- Merritt & Coughlen—Woolen goods.
- Mrs. L. L. Jackson—Dress patterns.
- Sewing Machine Cabinet Company—Sewing machines.
- School Furniture Works—School furniture.
- Mitchell & Rammelsburg—Furniture.
- Mrs. M. Deitrich & Walker—Millinery.
- Smith & Dixon (Port Byron, N. Y.)—Patent steel skeleton harvester guards, and also school furniture.
- Higgins & Ryan—School furniture.
- Hildebrand & Fugate—Hardware.
- C. E. Geisendorff & Co.—Woolen goods.
- Agents for Sewing Machines—Blees', Wilson's, the Domestic, and the Victor.

#### POWER HALL.

The upright engine which drives the machinery in this department, was manufactured by Messrs. Greenleaf & Co., of this city. The following is a list of the machinery, thus far, on exhibition:

- Dean's patent steam pump, drawing four hundred gallons of water per minute.
- Brewer's engine.
- Baxter's engine.
- Sinker, Davis & Co.'s engine and portable saw mill.
- Hogan's cider and wine press.
- Knowles' engine.
- King & Hanna's corn sheller.

ON THE GROUND

We noticed Forsyth's scales, Fairbank's scales, monuments and tombstones, from the City Marble and Granite Works, of 48 and 50 Kentucky avenue, Rouse's driven well, which supplies the whole ground with drinking water, having a fountain, with 120 faucets, conveniently located.

A great number of cattle and large amount of machinery, intended for exhibition, is still delayed on the Railroads.

There was a very interesting double team horse race yesterday at the State Fair race course. The horses entered belonged to Jas. Wilson, of Rushville, Glydden & Williams, of Raleigh, Mr. Mc Moor, of Thornton, and T. Ballard, of Mason. The first premium was won by Glydden & Williams, the second by T. Ballard. Time, first heat, 2:55; second heat, 3:03. Messrs. J. W. Scott, J. B. Gerard, and L. L. Lawrence presided in the capacity of Judges.

NOTES.

Jones' Silver Cornet Band, of Fort Wayne, has been engaged to play at the grounds during the entire Fair. It has the reputation of being one of the best organizations of the kind in the Northwest. The leader is a gentleman of high reputation in musical circles, and the members, twenty-one in number, prove by their proficiency that they have been well drilled, and have paid the utmost attention to the teachings of their instructor.

The indications are that the attendance to-morrow will be the largest ever seen in our city.

THE STATE BOARD.

The State Board of Agriculture held a meeting at the Mason House, Monday evening, at which several matters of importance were discussed. It was resolved not to allow any side shows or exhibitions of any kind on the ground during the Fair.

On motion of Mr. Claypool, a grand exhibition of premium cattle was ordered for Friday forenoon, at 11 o'clock,

the display to be preceded by a band of music, the President and the members of the Board.

On motion of Mr. Claypool, the proposition of Mr. H. R. Allen for an exchange of property was laid upon the table, in the meantime the Board to visit the premises.

It was moved and carried to request Governor Baker to authorize 10,000 copies of the report of the Board for this year to be printed.

Messrs. Basler, Hamrick and Dowling were appointed to revise and prepare matter for the forthcoming report.

The President was authorized to appoint Committees to name Committees to make the award of Special Premiums offered. The following were named by the President:

Live Stock Department—Messrs. Mitchell, Davidson, Hamrick, North and Mutz.

Horticulture and Miscellaneous—Messrs. Johnson, Dowling, Poole, Basler and Nelson.

Mechanical and Agricultural—Messrs. Crim, Seward, Claypool, Burke and Caldwell.

The members of the Board, Superintendent, Secretary and Treasurer were each furnished with twenty-five gate tickets and twenty-five meal tickets on the Fair Grounds Hotel.

The Board met again on the grounds yesterday, and held both morning and afternoon sessions.

Messrs. Benham Bros., W. A. Bradshaw, M. A. Stowell and Charles Soehner proposed not to compete for or accept any premiums offered on their class of goods, provided there were no other entries.

The proposition was received and accepted.

The premium offered for best cow with calf will be paid to best cow, the calf not considered.

On motion, Messrs. Tucker & Bro., Kosciusko, were granted the privilege of exhibiting their famous "triplet steers," weight about 7,000 pounds, on the grounds.

The rest of the session was spent in dividing the work of committees among the members of the Board.

A meeting was held last evening, at which the work of

superintending the work of committees was apportioned to the several members of the Board.

The Board rescinded its order against admitting carriages free on complimentary tickets. Holders of these will now be allowed to enter free in carriages.

#### THE ATTENDANCE, ETC.

The attendance yesterday was very fair, numbering several thousand. The Fair, to visitors, begins to-day, and we look for a large concourse of people on the grounds. The display is of the most interesting character, and larger, in many respects, than any of previous years.

One thing that will arrest the visitors' attention, is the immense number of eating and drinking stands. In addition to those which were in full blast last year, all the space beneath the amphitheater, which has been devoted to carriages and sewing machines, is subdivided and occupied as eating stands. They all appear to do a thriving business.

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#### THIRD DAY.

WEDNESDAY, October 2, 1872.

The third day of the State Fair was an immense success, and if any doubts as to the general results of the Fair were entertained by any one, they must have vanished, like mist before the sun, by the immense attendance on the grounds, and the universally fine display in every department—save one.

We say, save one, because Power Hall is not filled by any means, and for this reason, the visitor will at first feel disappointed at the display, because that which in olden time first and most powerfully attracted his attention, the noise of

machinery in full motion, is missing to a large degree. In this respect only, is the Fair deficient, while in every other department the number of entries is largely increased, and their character much higher than ever.

The attendance yesterday was gratifying evidence of the growing interest taken by the people of the State in these annual exhibitions, made for their benefit, solely. At noon more tickets had been sold than were disposed of on the morning of Thursday of last year, which would indicate an attendance of about twenty thousand during the day. This being the "big day," when every one will go, it is confidently expected that no less than fifty thousand will be on the grounds.

All there will be of a display was on the grounds yesterday, and this morning we give a brief notice of the more prominent entries in the several halls. First comes

#### FINE ART HALL,

which is always the first point of attraction to the visitor.

Entering at the west end, to the right is seen the first display of false teeth and dental instruments, of the Ohio Steam Dental Company. Despite the ghastliness of this array, it is a point of great interest, because of a little machine, constantly in operation, showing the action of the human jaws, with false teeth inserted.

Next comes the usual large display of fancy work, shell, bead, wax flowers, etc. It is unusually fine this year, and includes a humming bird's nest, with four eggs, exhibited by Mrs. Phebe E. Davidson, and a beautiful cross of wax flowers owned by Mrs. J. F. Huddart.

There is also a case of watch works, entered by the National Watch Co., of Elgin, the incessant ticking of which causes many to stop.

The beautiful appearance of the hall is largely due to the display made by our photograph artists. D. R. Clark's display is probably the most extensive. Judkins, Cadwallader, and Fowler have elegant specimens of their work. A pho-

tograph of the officers of the Waddleton and Widdleton Railroad, in a group, by Cadwallader, attracts much attention. H. Leiber & Co., occupy one side of the east wing of the hall, with their display of pictures, oil paintings, and chromos. Messrs. Dennis, Cox & Lietz, enter numerous portraits in oil, which include those of several well-known citizens—the late J. R. Osgood, Judge W. K. Gresham, and Hon. S. H. Buskirk.

Opposite Lieber's collection, the Terre Haute Commercial College, and Bryant & Stratton's branch at this point, show numerous specimens of penmanship, very superior in their design and execution. In this department, A. J. Fitch, of Thompson, Geauga county, Ohio, exhibits a large variety of fancy turning, which is well worth looking at.

S. W. Vance has here a fine collection of stuffed birds.

The space devoted to musical instruments is now entirely filled, and besides pianos and organs, includes cases of small instruments, by Benham Bros., and Bradshaw.

The attaches of the several firms represented, keep the instruments issuing forth sweet sounds continually, and surrounded by an interested crowd.

These parties enter their goods with the express proviso that no premiums are to be awarded.

The matter of light is well represented. At the north side of the west entrance is a large collection of lamps and fixtures, burning Ward's oil, with Wood's attachment. On the other side, near the center, is the collection of the Indianapolis Refining and Manufacturing Company, of lamps and fixtures for burning sunlight and other oils. From the eight sides of the octagonal tower in the center, depend eight elegant styles of gas fixtures, entered by John G. Hanning.

Of great interest to the ladies is a case of millinery goods, by Mrs. Dietrichs & Walker, very handsome in the west end, and two cases of fancy dry goods, fine underclothing and notions by M. H. Spades.

Equally as interesting to the gentlemen are the cases of fine gents' furnishing goods, from the houses of Eddy & West and R. R. Parker.

In large collections, there are a case of candy, from Daggett & Co.; a case of chemicals and trusses from Browning & Sloan; a large collection of fancy groceries, from W. I. Ripley; notions and toys, from Charles Mayer; cases of books and stationery, from Braden & Burford and Todd & Carmichael; boots and shoes, from George C. Steinhauer.

Leaving this beautiful place with regrets that time does not permit a longer stay, the visitor passes to

#### FURNITURE AND MISCELLANEOUS HALLS.

In the former Mitchell & Rammelsburg Company make the largest show of furniture. They have on the floor, parlor, dining room, chamber, library, office and hall sets, complete, all in black walnut. A self-rocking cradle in the chamber set, attracts the largest share of attention, and many a weary Benedict sighs for the time when they shall come into general use. The windows on their side of the hall are hung with lambrequins and curtains, giving a handsome, home-like appearance.

On the other side of the east wing is the display of Spiegel & Thoms, who enter a parlor set and a chamber set only—very beautiful both of them.

Next is a combination case, covering a gold-plated Wheeler & Wilson sewing machine, manufactured by the Cabinet Manufacturing Company, of Indianapolis. It is provided with every necessary and convenience imaginable, and is a very beautiful piece of mechanism. What adds to its beauty is the fact that it is made entirely of Indiana wood, black and white walnut, and birds-eye maple.

A large collection of Andrew's school furniture and charts fill up the rest of the space.

Passing into the west wing, the visitor finds that sewing machines nearly monopolize the space. Those on exhibition are the Domestic, Wilson, Bles, Victor and Weed. These are in constant operation, and surrounded by an admiring throng of ladies, principally.



In one corner is a large collection of jellies, preserves, butter, cake and bread.

Miscellaneous Hall crosses Furniture Hall at right angles. Entering on the north end is seen on either side an immense display of flannels, blankets, jeans and plaids made by C. E. Geisendorff & Co., and Merritt & Coughlen.

Next, on the left, is another collection of jellies alone, which were crowded out of Agricultural Hall.

Then comes a show of patterns, in paper, of various kinds, which were posted conspicuously in the hall.

On the opposite side is L. S. Mossler & Bro's show of clothing and gent's furnishing goods, and Hildebrand & Fugate's collection of cutlery and fine hardware.

The entire south end is filled with a bewildering display of domestic manufactures with the needle. It would be impossible to specify any of them, and a conception of them can only be obtained by inspection. Such a display in this department was never before seen. The visitor will spend as much time here as possible, wondering at the, to them, inexplicable patience out of which were wrought some of the finer fabrics. Immediately west is the

#### CARRIAGE AND WAGON HALL.

The space is filled here largely by the Shaw & Lippincott Manufacturing Company, whose work, for its style and elegance, is fast winning for them a national reputation. They have twenty-one pieces of work on the floor, comprising all grades of work, from a plain open buggy to a large and elegantly finished family carriage. Pennoyer & Shaw, of Chicago, enter three pieces of road wagon work—very fine. George Lowe has five entries of his work, which compare favorably with any. The Indianapolis Wagon Works and a Greensburg firm have farm wagons on exhibition, both very fine pieces of work. The wagon entered by our wagon works is the one which took the blue ribbon (first premium) at the Cincinnati Exposition last week.

In the center of the Hall, the Woodburn Sarven Wheel Company show a large collection of their work, including

the patent and common wheels, hubs, felloes and spokes. Charles W. Smith is in charge, and takes pleasure in telling how that "though every spoke in a patent wheel may be wrenched short off, sir, you can't start one at the hub, sir. Fact." And they all believe it, too. The next place one will run into on this round of the halls, is the

#### MECHANICAL HALL,

Which was the center of attraction yesterday. It is now fitted up, and contains so many objects of interest that a day could be passed with both profit and pleasure in passing through it, and examining them with the care to which they are entitled.

The following is a list of the principal articles on exhibition in this department:

Rees' patent churn.

Boone county washer.

Hines' patent buggy wheel.

Merrill's beef-stake mangler.

Silvert & Son's specimens of blacksmithing.

Gould's patent pumps.

Rouse's patent driven pumps.

Keeney's Switzerland seed sower.

Barney's baling press.

Fairbank's standard scales.

Williams & Son's patent eagle pruning implements.

Smith's egg-carrier and three horse whiffle tree.

David Munson's patent lightning rod.

Atkins' saws, of all kinds.

Forsyth's scales.

Hood's patent egg-beater.

Specimens of leather, from the Hide, Leather and Belting Company.

Frank A. Boyd's paints and oils.

Berner, English & Over's bedstead fastening.

Ebner, Aldag & Co.'s varnish.

Mears & Lilly's varnish.

Specimens of bottles and jars from the Indianapolis Glass Works.

Specimens of card printing from Wright, Baker & Co.'s Printing House.

Peter Mather's chart for cutting garments.

John F. Daniels' graduating scale for cutting boot legs.

Specimens of hardware from Hildebrand & Fugate's.

Long & Alstatter's reaper and mower knives.

William Craig's ax helves.

W. N. Foster's steel harvester guard.

Specimens of Kenton's horseshoes.

J. A. Myers' mole trap.

Sperry's patent bed bottom.

Soft soap, made by Mrs. William Shank, of this city.

Display of soft and hard soap, made by Mrs. A. Wallace, of this city.

Specimens of soft soap, made by Mrs. Ellen R. Marvel, of Royalton, Indiana.

Display of soft and hard soap, made by Mrs. M. Caylor, of this city.

Specimens of Indiana coal owned by Niblock, Merrifield & Co.

McCullum's drain tiles.

Wallace's tubs, washboards, mops, pails and baskets.

Jordan's American fire kindler.

Frauer, Bieler & Co.'s harness and lap robes.

Wiggins & Co.'s horse collars.

Dougherty's horse collars.

W. H. Martin's cooper ware.

Udell's universal ladder.

Specimen of American plate glass, from New Albany.

Frank Erdelmeyer's polished plate and colored glass.

Specimens from the Richmond Malleable Iron Works.

Specimens from the Diamond Cutlery Company, of Richmond, Indiana.

Louis Kolb's fancy turned fence.

Neal's Victor washing machine.

McClure's patent dash churn.

Fisher's refrigerator.  
Pardeick & Brown's boring machine.  
Calkin's champion washer.  
Providence clothes wringer.  
W. F. Wells, washing machine.  
Leach's Patent Health Protecting Star Washer.  
Baker's eave-trough hanger.  
Specimens of boots and shoes, from J. E. Beasley's.  
Specimens of wheelbarrows, from the Indianapolis Barrow Works.  
Parlor Queen, butter bowl churn.  
Bradshaw's broom-making machine.  
Lithographing press (at work,) from Braden & Burford.  
Silver's patent meat chopper.  
Sterrett's vegetable and meat chopper.  
John Wagner's sausage stuffer.  
Power meat chopping machine.  
Mitchell, Stevenson & Co's parlor stove.  
Forrester's wood cooking stoves.  
Patent steam jet pump.  
Stillwell & Bierce's lime extractor and water heater.  
Rotary blower, from Greenleaf Machine Works.  
Valley's clothes bars.  
Curtis' zinc collar pad.  
Stiles' sewing machine attachment.  
Champion bee-hive.  
Pugh's Homestead bee-hive.  
The Wilkinson bee-hive.  
The Queen bee-hive.  
The Gray & Winter bee-hive.  
Passing from here, the visitor comes right upon

POWER HALL,

At which he will stop in dismay at the beggarly array, and not feel inclined to enter, But two or three things of interest are there, notwithstanding.

Prominent among them is a tile and brick machine, from Michigan, which chews up clay in the rough, and spits

forth beautifully moulded brick or tile as is wanted. Some of the tile made by this machine is used to carry away the waste water from the tanks supplying the drinking fountains.

A little upright engine, made by the Colt Arms Manufacturing Company, of Hartford, Connecticut, will attract attention because of its uniqueness of construction. The cylinder sets within the boiler, and that includes a fireplace also.

Sinker, Davis & Co. show a beautiful twenty-five horsepower stationary engine, which is put to no use in running machinery.

From Power Hall the

#### OUTSIDE SHOW

Of machinery may be seen. It consists entirely of horse-powers, portable engines and saw mills.

In this line the Eagle Machine Works, Chandler & Taylor, Gaar, Scott & Co., and Sinker, Davis & Co., are the principal exhibitors.

There is a large number of threshers on the ground, but none have been put in operation yet.

The liveliest scene on the grounds is within the circle of the race track, where the agricultural implements are placed.

We append the names of the principal exhibitors:

Mause, Breneman & Co., Dayton, Ohio.

Naperville Agricultural Works, Naperville, Illinois.

Bucher, Gibbs & Co., Canton, Ohio.

M. L. Gibbs, Canton, Ohio.

Moline Plow Works, Moline, Illinois.

Sol. Beard, Lafayette, Indiana.

Lafayette Plow Works, Lafayette, Indiana.

Houck, Spencer & Co., Indianapolis, Indiana.

S. Horney & Co., Richmond, Indiana.

M. Butler, Vernon, Indiana.

Charles Parrott, Dayton, Ohio.

William Burton, Kankakee, Illinois.

H. Prier, Indianapolis, Indiana.

Case & Parker, Indianapolis, Indiana.

Raff, Cock & Co., Davenport, Iowa.  
O. L. Neisler, Indianapolis, Indiana.  
Walker & Piatt, Laporte, Indiana.  
P. P. Mast & Co., Springfield, Ohio.  
A. B. Reeves, Knightstown, Indiana.  
Wayne Agricultural Works, Dublin, Indiana.  
John Dodds & Co., Dayton, Ohio.  
Brown, Manly & Co., Malta, Ohio.  
Wier Plow Company, Monmouth, Illinois.  
Hoosier Drill Company, Milton, Indiana.  
N. C. Thompson, Rockford, Illinois.  
Lewis Campbell, Centerton, Indiana.  
J. C. Erwood, Vernon, Indiana.  
J. M. W. Heaton, Indianapolis, Indiana.  
Dean & Co., Moline, Illinois.  
W. M. Lanham, Noblesville, Indiana.  
King & Hamilton, Ottawa, Illinois.  
Princeton Manufacturing Company, Princeton, Illinois.  
Games & Trussler, Greensburg, Indiana.  
Thomas, Ludlow & Rogers, Springfield, Ohio.  
Long & Alstatter, Hamilton, Ohio.  
D. E. McSherry, Dayton, Ohio.  
Farmers' Friend Manufacturing Company, Dayton, Ohio.  
Norris & Bro., Rushville, Indiana.  
D. Barton, St. Paul, Indiana.  
W. M. Ball, Morristown, Indiana.  
F. A. Lehr, Indianapolis, Indiana.  
S. B. Mann, Dartown, Ohio.  
Excelsior Works, Massillon, Ohio.  
D. L. Jacques, Hudson, Ohio.  
J. George Stilz, Indianapolis, Ind.  
Cole Bros. & Bocking, Greencastle, Indiana.  
Wm. Craig, Indianapolis, Indiana.  
G. W. Lyon, Peoria, Illinois.  
Hurst, Dunn & Co., Peoria, Illinois.  
Trader, Collier & Co., Xenia, Ohio.  
Remy & Co., Hamilton, Ohio.

To the north-west of these, several farm gates, and a hay rake and cart, are in operation.

In the Live Stock Department, the entries closed yesterday, but none worthy of special mention were made.

The predicted increase in the poultry show was made, and the display far exceeds any heretofore even deemed possible. Officer John A. McKinney has several coops entered, and it is generally conceded that he has the finest display on the grounds. His imported cock, "Tecumseh," and his chickens, are unequaled anywhere, and have taken the red ribbon at Cleveland, Grand Rapids, and Saginaw.

#### THE PROGRAMME YESTERDAY.

As soon as the several committees could be got together yesterday, the exhibition of live stock was begun. In thoroughbred jacks, jennets and mules, and breeding cattle (all short horn Durham,) the display was very fine, and excited much comment because of its superiority. The awards of premiums in these classes will be found below.

Two races occurred in the afternoon, which were hotly contested. The first was for trotting stallions, premiums one hundred dollars and fifty dollars, in which there were six entries. Glidden & Williams' horse, from Raleigh, took two heats in succession, in 2:44 and 2:45, with L. L. Lawrence's horse, Dublin, second.

The next was a race for pacing stallions, the premiums the same. This proved to be a very close and interesting affair, between T. Dickerson's horse, from Versailles, and John Edwards' from Monrovia, who kept almost side by side during the two heats, but Dickerson's animal managed to come in, about a neck ahead, both times, in 2:37 and 2:38, winning the race and first money. There were three other horses in the race, but they came in just after every one forgot that more than two were engaged.

#### THE ENTRIES.

At noon the committee swooped down upon the Secre-

tary's office and carried off the entry books for the purpose of examining and making awards. At that time the entries were as follows:

Live stock.....	1,140
Agricultural and Horticultural .....	769
Miscellaneous and Fine Arts .....	464
Mechanical.....	1,053
For special premiums.....	371
Total.....	3,797

Enough entries were made after the books were taken away to swell the aggregate to 3,900. The miscellaneous entries would have been larger had the Board changed with the times, and revised the premium list. The present list was made eight or ten years ago, and the fashions have changed, so have the tastes of the ladies, and so has not the premium list—consequently what the ladies now delight in spending their time in concocting and executing are not included in the premium list, and the display is small. The matter should receive the early attention of the Board.

#### MEETING OF THE STATE BOARD.

The meeting of the State Board of Agriculture yesterday was devoted almost exclusively to the formation of committees and getting them to work. This job seemed to be almost a hopeless task, but it was finally completed in a satisfactory manner to all.

Hon. D. P. Holloway, formerly, and for many years a member of the Board, was invited to attend the deliberations of the Board, and the President was directed to tender him the hospitalities of the Board during his stay.

The same courtesy was extended to Mr. R. M. Cole, the accredited agent of the Iowa State Agricultural Society.

#### MISCELLANEOUS.

A noticeable feature of the exhibition is the cramped appearance of the grounds, everything being, in a measure,



jammed together. The Board of Directors have labored hard to make the Fair what it is, a grand success, but the Fair Ground should contain at least eighty acres of diversified ground, ornamented with lakes and fountains, and beautified with all the attractions of nature and art.

Another noticeable feature is the almost total absence of the bee man and the bee hive. This is so remarkable as to be given without comment.

Shropshire's twelve thousand dollar Durham heifer walked away with another red ribbon yesterday, fairly distancing all its competitors in the three year old show. The animal is a truly wonderful creature, and weighs one thousand seven hundred and eighty-two pounds. It will be in the procession of premium cattle to-morrow morning, which will be worth seeing.

The receipts at the Treasurer's office were about two hundred dollars larger than on the corresponding day last year.

To-day the schools of the city will be dismissed for the purpose of affording an opportunity to the public to attend. All the private schools of the city are included.

For the trot this afternoon several entries of fast horses were made yesterday morning. They are all from the Trotting Park, and just go to the State Fair grounds to take the purse, while they've nothing to do down south. The programme for to-day is as follows:

THURSDAY, FOURTH DAY—9 A. M., examination of horses for general purposes, in their order in the horse ring; 11 A. M., exhibition of matched horses in their order; 1 P. M., best pacing gelding or mare, premium \$100; second premium, \$50; 2:30 P. M., best trotting mare or gelding, premium \$150; second premium, \$75.

## FOURTH DAY.

THURSDAY, October 3, 1872.

From dawn till eventide yesterday, an unbroken line of vehicles was steering their course to the State Fair grounds, fairly loaded down with humanity. The street cars were crowded to their utmost capacity, and then failed to accommodate all who desired to reach the grounds; and finally almost every private conveyance in the city bore its load to the Fair. As a consequence the grounds were crowded by far the largest attendance within the history of the State Board. A rough estimate places the attendance at 40,000 during the day, while from 25,000 to 30,000 were on the ground at one time.

Poor suffering humanity toiled and struggled through the several halls, but the crush was so great, that only in rare instances did a face appear at the exit door without bearing a frown. The more sensible strolled over the grounds, and enjoyed the many comical sights to be witnessed by those who are on the lookout for them. The programme for the day began at 9 o'clock, with the exhibition of horses for general purposes in the ring, followed by the matched horses in their order. The display was large, and generally of a superior order. The premiums in these classes, as well as in sweepstakes on cattle, shown later in the day, will be found below.

Soon after dinner time the amphitheater, and the space on each side of the track in the vicinity of that building, was packed by a dense throng of people, on foot and in carriages, drawn thither to witness the pacing and trotting races, by the report that some fast horses on the Trotting Park Course would be entered, and in this they were not disappointed. The first race called was the pacing race. In this there were five started, but all interest was centered in "Copper Bottom," who won the \$800 pacing purse at the lower course in

the morning, and "Hoosier Tom," an entry for the same purse. Three heats were required to be paced, "Copper Bottom" taking the first and third, and "Hoosier Tom" the second. "Copper's" best time was 2:21, the fastest ever made on that track. In the trotting match there were but four started, although about a dozen entries were made. A bay horse, driven by John Browning, and said to be owned by a Mr. Nesbit, took two straight heats, his best time being 2:27. As in the other race, the interest centered around two horses, the one mentioned and the gray horse "Unknown." The latter gave John a hard tussle for the first place, but the little bay stepped away from him nicely, never making a break in the race. These races, for interest, will compare favorably with any ever seen in the city, and the time was of the very best. In both races the first premium was \$150, and the second \$75.

#### A PLEASANT INCIDENT.

L. W. Moses, the optician, having offered a reward consisting of a fifteen dollar pair of gold spectacles to the oldest man or woman who visited the State Fair, the Board directed that a register be opened to all who wished to contest for the prize. But seven names were entered, as follows:

Jonathan Osborne, Broad Ripple, Indiana, born 1777; age, 95 years.

David Morris, Acton, Indiana, born May 23, 1785; age, 87 years.

Polly Craig, Indianapolis, born in June, 1785; age, 87 years.

Peter Looney, Rushville, Indiana, born July 24, 1785; age, 87 years.

H. Alcorn, Indianapolis, born May 8, 1786; age, 86 years.

William Keeley, born in Pennsylvania, 1788; age, 84 years.

Thomas Silvers, of Pendleton, Indiana, born 1793; age, 79 years.

As Mr. Osborne did not make his appearance, the spectacles were presented to Mr. Morris, the next oldest gentleman on the list, by General Superintendent H. W. Caldwell, who spoke as follows:

**MR. MORRIS:** Age is honorable. From our recollection we were taught to reverence those whose heads have been silvered by time. To look back upon a well spent life, would, at your age, be a blissful retrospect; while to reflect upon an unworthy career would fill the soul with despair. By the law of nature, we necessarily suppose that inevitable change, which is dreaded so much by all, to be near you, and, therefore, we trust that you may, by the eye of faith, see far enough into the eternal world to give you hope for the golden crown that awaits the ransomed beyond the portals of death.

By the request of the Board of Directors, and in behalf of Mr. L. W. Moses, I present you these spectacles, as being the oldest man on the grounds to-day.

Mr. Morris returned his thanks in a few heartfelt remarks, after which the assemblage dispersed.

After the conclusion of the races, by order of the Board, the sweepstakes on cattle were awarded by the committee, the display of stock being made in the large ring. For the sweepstakes on the herd of bulls, and four cows or heifers, there were eleven entries, a number unprecedented in the West. Throughout all the classes the display was equally as fine. A gentleman, who has been traveling to fairs all season, says the display was never equaled in the West, at any time or any place.

At 11 o'clock this morning, the entire collection of premium cattle, headed by Jones' Silver Cornet Band of Fort Wayne and the State Board of Agriculture, will make the circuit of the ring. This will be a sight not often witnessed, and should be visited by a large crowd. At 12 o'clock a large portion of the stock will leave the grounds for shipment to the St. Louis Fair, which opens Monday next.

STATE BOARD OF AGRICULTURE.

Not much business of general interest was transacted by the State Board of Agriculture yesterday. A petition was received from Hyde & Irwin, of this city, asking that the committee on jacks, jennets, and mules, be requested to examine a jack entered by them on Tuesday, but not brought on the ground until Wednesday, under a misapprehension, and that, if found worthy, a premium be awarded him. The petition was laid on the table.

On motion of Mr. Poole, it was

*Resolved*, That we, as a Board, adhere strictly to our published rules and regulations, and that the committees be instructed to be governed and guided by them in all cases; and that when they are not complied with, entering for premiums, such articles be rejected.

It is a matter of doubt whether the Board has yet adjourned or not, as it broke up in a somewhat demoralized condition about the time the trot came off, and our reporter couldn't find them as a body after that.

MISCELLANEOUS.

A number of distinguished gentlemen from abroad were upon the grounds yesterday, among whom we noticed ex-Governor Dawson, of Utah, and General Sol. Meredith; Mr. Charles Abbot, of the Abbot Pantomime Troupe, was also present yesterday. It is the first American fair he ever saw; everything attracted his notice, and he took great delight in bargaining for every article he came across. His purchases in the agricultural implement line were simply immense.

Some plodding statistician has discovered that about sixteen hundred hogs are on the grounds.

PROGRAMME FOR TO-DAY.

FRIDAY, FIFTH DAY—A. M., continuation of awarding premiums; closing up of examination of articles in general; 1 P. M., sweepstakes trot, open to all, for premium of \$300; 3 P. M., sweepstakes, double trotting team, premium \$100.

## FIFTH DAY.

THE CLOSING DAY—PARADE OF PREMIUM LIVE STOCK—  
LIST OF AWARDS OF PREMIUMS.

FRIDAY, October 4, 1872.

Yesterday was really the close of the Twentieth Annual Fair of the Indiana State Board of Agriculture, and the exhibition went out in a manner becoming the great success which has attended it. The announcement that a grand parade of all the premium live stock, would be made at eleven o'clock, drew out a great many persons who had heard of the wonderful collection there was on the grounds, and who could gratify a curiosity to see the best of it at once and with no trouble. By the time announced for the parade to take place, the grounds were filled by a crowd but little less in extent than the one present on Thursday. In a few minutes, the members of the Board appeared in the ring, mounted on horseback, and the caravan moved around the track in the following order:

Members of the Board.

Jones' Silver Cornet Band. .

Premium cattle.

Premium horses.

The sight was an inspiring one, and surely so many specimens of beautiful cow flesh and horse flesh were never gathered together before. We doubt if even those who have been on the grounds every day of the Fair, had the faintest conception of such a magnificent display as was made in the ring yesterday. After marching half way round the track, a countermarch was ordered, and then the procession broke ranks. Immediately thereafter, a majority of the fine stock was removed from the grounds to the depot, for shipment to St. Louis, where they are entered for the fair next week. While the procession was passing headquarters, the Chair-

man of the committee on award of premiums for Poland China and Chester White breeds of hogs, told our reporter of the display made in that class alone. He said that it would nearly equal that in the ring, and drew the books to prove his assertion. They show three hundred and twenty-five Poland China, and fourteen Chester White pigs on the ground. There is not a poor hog among them; any one would be an honor to the best collection in the country. Notwithstanding the superior quality of the entire lot, the committee found little trouble in bestowing the \$370 in premiums at their command.

#### THE SWEEPSTAKE TROTS.

In the afternoon, another immense throng gathered in and around the amphitheater, to witness the sweepstake trots by geldings or mares and double team. In the gelding sweepstakes, John Browning's bay horse, and Glidden & Williams' bay, from Raleigh, were the only ones which started, although there were some half dozen entries. As on Thursday, the Raleigh horse was just fast enough to lose the race, Browning's little animal taking three straight heats, by neck only, in 2:47, 2:45, and 2:46. The incentive to this rapid getting around the track, twice, without stopping, three times in succession, was a matter of three hundred dollars—fifty dollars a circuit.

For the double team sweepstakes, Glidden & Williams' pair was the only one that came forward. They succeeded, by a desperate effort, in winning the first heat and the money—one hundred dollars—in 3:01, 2:52, and 2:49.

With the trot, died away the interest in the Fair, by the spectators, and soon the grounds were almost deserted.

By an order of the Board, entries for the St. Louis Fair were allowed to be removed from the ground, and by evening a very decided change in the appearance of the grounds, had taken place.

To-day, the programme includes only the paying of premiums, and the removal of articles on exhibition.

## MISCELLANEOUS.

An interested observer of the display of premium cattle, was the honorable George S. Boutwell, who was on the grounds during most of the day. Mr. B. is a farmer himself, when at home, and is happy in the possession of sixty head of Jersey and Ayrshire cattle, which he thinks preferable, in New England, to the famed short-horns of the West. He says he never saw a finer display of the latter than that of to-day.

In the show of premium cattle, the \$12,000 cow of Shropshire's, which took every premium for which it was eligible, was the "observed of all observers." Next in point of interest, were Tucker's three steers. The display represented many thousand dollars. General Meredith's short-horn Heir of Oakland, cost \$2,500 last February. Mr. Sandusky's premium cow cost him \$2,950, in gold, in England, last year. Neither of those animals can be bought now.

Gen. B. F. Butler was on the ground yesterday morning, in company with Gen. Coburn. Among other places, they visited the carriage hall, where a road wagon, entered by George Lowe, attracted Gen. Butler's attention. He asked permission to try its springs, which was granted. The upshot of the matter was, that he ordered the vehicle sent to his home, Lowell, Massachusetts.

The Treasurer's count shows that thirty-two thousand tickets were sold Thursday, which, with the admission on free tickets, estimated at three thousand, would make the number on the ground fully thirty-five thousand. Mr. Dickson deposited \$12,300, as the receipts for that day. The great rush being over, the crowd appeared somewhat thin yesterday, but will be very much larger than on Friday of last year.

The increase of ten cents on the price of tickets, will make a difference of between five and six thousand dollars in the treasury, over the receipts of last year.

During all the week, Jones' Silver Cornet Band, of Fort Wayne, has furnished the music for the Fair, no other band



offering to compete for the premium with them. The members are a very gentlemanly set, and under the skillful direction of Prof. Jones, have attained a high degree of proficiency. The band returns home this evening, the possessors of the first premium offered by the State Board of Agriculture for the best musical instrument band.

#### STATE BOARD OF AGRICULTURE.

At a meeting of the Board in the morning, it was ordered that the fruit on which premiums are granted, shall have been raised in the districts for which they are offered:

Mr. Dowling offered the following resolutions, which were made the special order for the meeting at night:

*Resolved*, That a committee of five members (with the President) be appointed to meet a committee of like number on the part of the Council, or citizens of Indianapolis, to consider the best mode to be devised for a more thorough and complete exhibition of the Agricultural, Mechanical, Mineral and Productive Industries of Indiana, including those Arts of Peace, which give life and beauty to the civilization of the nineteenth century.

*Resolved*, That this Board, not abating in zeal for the great industries which have long been its chief care, believe that the time has arrived when a higher field of usefulness shall be initiated for our own State Board; and that Indiana, following the example of her older sisters, should institute a *State Exposition* which shall more fully and satisfactorily exhibit the advances making in all the leading industries of our people.

Mr. Seward presented a paper on the same subject, as follows:

WHEREAS, In the opinion of this Board, the growing Agricultural and Mechanical interests of our State, imperatively demand at our hand, facilities for an annual exhibition, equal to that of any State in the Union; and whereas, the buildings and fixtures now in use on our grounds are temporary and entirely inadequate to the growing wants of exhibitors and visitors; and whereas, it is believed to be the wish of a large majority of the citizens of this State that our State Fair be permanently located in the city of Indianapolis. Therefore, be it

*Resolved*, That a committee of five, including the President, be

selected from the State Board of Agriculture to confer with the City Council and Board of Trade of the city of Indianapolis, and learn what amount in donations, and what amount of guaranty fund can be secured so as to enable us to erect large permanent buildings, and otherwise improve our grounds, so that we may have an annual exhibition worthy of the time in which we live and of our State; and that said committee be required to report at our next meeting.

On complaint, it was resolved that Mr. Poole and Secretary Heron be appointed a committee to investigate and report in regard to the I. C. & L. Railroad charging full fare during the first two days of the State Fair in violation of agreement.

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## SIXTH DAY.

### CLOSE OF THE EXHIBITION—IMPORTANT ACTION OF THE STATE BOARD—THE PREMIUMS AWARDED.

SATURDAY, October 5, 1872.

Saturday was the closing day of the Twentieth Annual Indiana State Fair, in many respects the most successful ever held. The features more prominently brought out have been named in the Journal heretofore, and a recapitulation is, therefore, unnecessary. Nothing was done Saturday, save to remove stock and machinery from the grounds, and by night the space was comparatively clear. A portion of the stock will remain on the ground until after the close of the St. Louis Fair, whither a number of exhibitors went with a portion of their stock.

The following is a statement of the receipts of the Fair of 1872, by days:

TICKETS.

Tuesday .....	1,109
Wednesday .....	7,979
Thursday .....	31,775
Friday .....	14,174
Total .....	55,035—\$19,262 25

AMPHITHEATER.

Wednesday .....	740
Thursday .....	4,351
Friday .....	2,564
Total .....	7,655— 765 50
Sale of booths, etc.....	3,456 25
Total receipts.....	\$23,484 00

The total sale of tickets during the Fair of 1871 was 62,866, which, at 25 cents each, netted \$15,716.50. The price of admission this year was 35 cents, which accounts for the increased gate receipts.

STATE BOARD OF AGRICULTURE.

Several meetings of the Board have been held since Friday morning, which are condensed in the following:

The award of the Poultry Committee on "the best pair of chickens, any kind," was sustained.

The proposition from S. Horney & Co., of Richmond, to present a first-class general purpose plow as a premium for best plowing done at the State trial of agricultural implements, in the trial of 1873, was accepted and placed on file.

The resolutions of Mr. Dowling, in reference to an exposition to be held by the State Board, (published Saturday morning,) were passed.

The resolutions of Mr. Seward, in connection with the same, were withdrawn.

The President announced as the committee called for by Mr. Dowling's resolution, Messrs. Dowling, Seward, Nelson, Hamrick, Caldwell, and President.

A communication from Messrs. Allen, Root & Co., re-

questing a conference with the Board in regard to a ninety foot avenue as the continuation of Delaware street, from Tinker street to the Fair Grounds, was taken up.

After a brief discussion, the matter was postponed until Saturday morning.

On motion of Mr. Poole, the President was authorized to appoint all delegates and committees requested by the Swine-Breeders' Convention to carry out the designs, and accommodate the great interests of that enterprise.

The President reported the following delegates to the Swine-Breeders' Convention, 20th November.

For the State at large—A. B. Claypool, of Fayette county.

On Poland China Breeds—Thomas D. Kingan, of Indianapolis.

On Chester Whites—O. L. Walker, of Madison county.

On Berkshires—B. Coffin, Indianapolis.

On Essex, Suffolks, and Small Breeds—O. P. Cobb, of Aurora.

Committee of Arrangements—Wm. Crim, Anderson; Jacob Mutz, Edinburg; L. A. Burke, New Harmony.

The premium on best fifteen varieties of winter apples, amateur's list, was awarded to W. B. Thompson, instead of Amos Thornburg, the latter not claiming the premium.

The protest of C. M. Cooper, against the award of the premium for the best trained horse, raised and trained by a boy, to Mr. A. C. Shropshire, was postponed until the January meeting of the Board.

M. L. Dunlap, of Champaign, entered protest against several awards in the Horticultural class, which was postponed until the January meeting, as was also the protest of Mr. Archibald Collins against the award of the sweepstakes premium on best buck and five lambs.

After the meeting of the Board, Saturday morning, a visit was made to "Lake Park addition," Mr. H. R. Allen's property, which he is desiring to exchange for the present State Fair grounds. Lake Park lies north-west of the Fair grounds, and between the Lafayette Railroad and the Crown

Hill street railroad tracks. On the return of the Board, the following was passed, at an informal meeting :

That it is the wish of the undersigned, members of the State Board of Agriculture, that our State Fair be permanently located on the grounds now owned by the Board, in the city of Indianapolis.

JOHN SUTHERLAND,  
W. B. SEWARD,  
T. V. MITCHELL,  
A. B. CLAYPOOL,  
B. NORTH,  
L. A. BURKE,  
F. C. JOHNSON,  
JOS. POOLE,  
S. DAVIDSON,  
WILLIAM CRIM.

The Board then adjourned, *sine die*.



# PREMIUMS AWARDED

AT THE

## INDIANA STATE FAIR, 1872.

### LIVE STOCK DEPARTMENT.

#### HORSES.

##### THOROUGHBRED HORSES.

###### *Six Entries.*

Best stallion, 4 years old and over, C. M. Poor, Springdale, Ohio...	\$50
Second best, J. G. Reynolds, Chalmers, White county, Ind.....	25
Best brood mare, Wood & Foudray, Indianapolis.....	30
Second best, J. G. Reynolds, Chalmers, White county, Ind.....	15

##### HORSES FOR GENERAL PURPOSES.

###### *One Hundred and Six Entries.*

Best stallion, 4 years old and over, J. G. Selman, Brownsburg, Ind .....	50
Second best, D. R. Smock, Southport, Ind.....	25
Best stallion, 3 years old and under 4, Thos. M. Robinson, Green- wood, Ind.....	40
Second best, P. E. Carson, Southport, Ind.....	20
Best stallion, 2 years old and under 3, J. G. Selman, Brownsburg, Ind.....	20
Second best, C. T. Flinn, Adams, Decatur county, Ind.....	10
Best stallion, 1 year old and under 2, Lewis Edwards, Conners- ville, Ind... ..	10
Second best, Lewis Edwards, Connersville, Ind.....	5
Best stallion, sucking colt, Lewis Edwards, Connersville, Ind.....	8
Second best, James Ruark, Greencastle, Ind.....	4

Best mare, 4 years old and over, (colt by her side,) Lewis Edwards, Connersville, Ind.....	\$30
Second best, R. H. Sampson, Gallaudet, Ind.....	15
Best mare, 3 years old and under 4, Clay Dawson & Co., Poolsville, Warren county, Ind.....	20
Second best, H. Jackson, Mooresville, Ind.....	10
Best mare, 2 years old and under 3, Bennet Shields, Rushville, Ind.....	10
Second best, Thomas Smock, Southport, Ind.....	5
Best mare, 1 year old and under 2, D. R. Smock, Southport, Ind..	10
Second best, Andrew Collins, Gallaudet, Marion county, Ind.....	5
Best sucking filly, Lewis Edwards, Connersville, Ind.....	12
Second best, Lewis Edwards, Connersville, Ind.....	6
Best mare, 4 years old and over, (regardless of having bred,) J. L. Winter, Marion, Ill.....	25
Second best, B. H. Lennon, Clarksville, Ind.....	10
Best gelding, 4 years old and over, John Blessing, Shelbyville, Ind.	25
Second best, T. Dickinson, Versailles, Ind.....	10
Best gelding, 3 years old and under 4, Frank Brumley, Bethel, Ind.	20
Second best, C. L. Doxey, Anderson, Ind.....	10
Best gelding, 2 years old and under 3, Isaac Smock, Indianapolis.	10
Second best, R. H. Sampson, Gallaudet, Ind.....	5

## ROADSTERS AND LIGHT HARNESS HORSES.

*Sixty-Four Entries.*

Best stallion, 4 years old and over, A. C. and Gus. Shropshire, Paris, Kentucky.....	\$50
Second best, Allen Jackson, Plainfield, Ind.....	25
Best stallion, 3 years old and under 4, Edwards & Richardson, Monrovia, Ind.....	40
Second best, J. M. McCullom, Indianapolis.....	20
Best stallion, 2 years old and under 3, James M. Oliver, Morton, Putnam county, Ind.....	20
Best mare, 4 years old and over, (with colt,) L. Edwards, Connersville, Ind.....	20
Second best, D. R. Smock, Southport, Ind.....	10
Best mare, 3 years old and under 4, W. M. Cook, Rushville, Ind..	20
Best mare, 2 years old and under 3, W. M. Smock, Southport, Ind.	10
Best mare, 4 years old and over, (regardless of having been bred,) L. L. Lawrence, Dublin, Ind.....	25
Second best, Gates, Pray & Co., Indianapolis.....	10
Best gelding, 4 years old and over, Danl. Brown, Centreville, Ind.	20
Second best, C. O. Cooper, Indianapolis.....	10



HEAVY DRAUGHT HORSES.

*Twenty-Six Entries.*

Best stallion, 4 years old and over, Gates, Pray & Co., Indianapolis .....	\$50
Second best, E. C. Covell, Milton, Ind .....	25
Best stallion, 3 years old and under 4, David Grant, Harristown, Illinois .....	40
Best mare, 4 years old and over, (with colt,) Samuel Mayne, Tetersburg, Ind .....	30
Second best, Gates, Pray & Co., Indianapolis .....	15
Best mare, 2 years old and under 3, C. P. Williams, Avon, Ind...	15
Best gelding, 4 years old and over, Robert Cornthwaite, Milton, Ind.....	20
Second best, Robert Cornthwaite, Milton, Ind.....	10
Best mare, 4 years old and over, (regardless of having been bred) K. Munter, Indianapolis .....	25

TROTTING AND PACING HORSES.

*Thirty-Nine Entries.*

Best trotting stallion, Gliddon & Williams, Raleigh, Ind.....	\$100
Second best, L. L. Lawrence, Dublin, Ind .....	50
Best trotting gelding or mare, J. W. Browning, Indianapolis.....	150
Second best, Gliddon & Williams, Raleigh, Ind.....	75
Best pacing stallion, F. Dickerson, Versailles, Ind .....	100
Second best, John Edwards, Monrovia, Ind.....	50
Best pacing gelding or mare, F. J. Worrells, Cary, Ohio.....	100
Second best, Daniel Rickets, Rushville, Ind.....	50
Best trotting double team, Gliddon & Williams, Raleigh, Ind.....	50
Second best, T. Ballard, Mason, Ohio.....	25

GELDINGS OR MARES.

*Thirty-Seven Entries.*

Best pair match geldings or mares, John Blessing, Shelbyville, Indiana .....	\$50
Second best, J. C. New, Indianapolis .....	25
Best pair match geldings or mares, F. B. Ainsworth, Plainfield, Indiana .....	40
Second best, W. M. Cook, Rushville, Indiana.....	20
Best heavy draft team, R. Cornthwaite, Milton, Indiana.....	40
Second best, K. Munter, Indianapolis .....	20
Best gelding, any age, L. M. Osborne, Rushville, Indiana.....	20
Second best, O. C. Loder, Raleigh, Indiana.....	10
Best mare, any age, L. V. Caldwell, Lewisville, Indiana.....	20
Second best, James A. Farrow, Greencastle, Indiana.....	10

## SWEEPSTAKES ON HORSES.

*Eighty-Two Entries.*

Best heavy draft stallion, E. C. Covill, Milton, Ind.....	\$50
Best heavy draft mare, A. Wallace & Merryman, Indianapolis...	40
Best stallion, of any age or class, except heavy draft, A. C. & Gus. Shropshire, Paris, Kentucky.....	75
Best mare of any age or class, P. H. Lennon, Clarksville, Ind....	50
Best stallion, showing five best colts, under 1 year old, Lewis Edwards, Connersville, Ind.....	100
Best trotting mare or gelding, J. W. Browning, Indianapolis.....	300
Best pair of trotting mares or geldings, Glidden & Williams, Ra- leigh, Ind.....	100

## JACKS AND MULES.

## JACKS, JENNETS, AND MULES.

*Twenty-Three Entries.*

Best jack, 3 years old and over, O. L. Walker, Pendleton, Ind...	\$50
Best jennet, 3 years old and over, James H. Quick, Clifford, Ind.....	20
Best mule, 4 years old and over, W. M. Cook, Rushville, Ind.,	20
Second best, W. M. Cook, Rushville, Ind.....	10
Best mule, 2 years old and under 3, Samuel Mayn, Teters- burg, Ind.....	20
Second best, J. E. Clements, Jamestown, Ind.....	10
Best pair of broke mules, 3 years old and over, James Wilson, Rushville, Ind.....	40
Second best, W. M. Cook, Rushville, Ind.....	20

## SWEEPSTAKES ON JACKS AND JENNETS.

*Four Entries.*

Best jack, of any age, Hyde & Irwin, Indianapolis.....	40
Best jennet, of any age, J. H. Quick, Clifford, Ind.....	15





Short-horn Cow, BEAUTY, 2d-owned by John Giles, Sullivan, Ind.

## CATTLE.

## BREEDING CATTLE.

*One Hundred and Fourteen Entries.*

Best bull, 4 years old and over, General Sol. Meredith, Cambridge City, Ind.....	\$100
Second best, J. H. Pickerill, Harristown, Ill.....	50
Best bull, 3 years and under 4, Harvey Sadowsky & Son, Indian- ola, Ill.....	75
Second best, J. T. Williamson, Thorntown.....	35
Best bull, 2 years old and under 3, J. H. Pickerill, Harristown, Illinois.....	50
Second best, Edw and Loe, Springfield, Ill.....	25
Best bull, 1 year old and under 2, W. W. Thrasher, Conners- ville.....	30
Second best, B. F. Bedford, Paris, Ill.....	15
Best bull calf, J. H. Pickerill, Harristown, Ill.....	20
Second best, A. S. Bryan, Greencastle, Ind.....	10
Best cow, 4 years old and over, Harvey Sadowsky, Indianola, Ill.	60
Second best, E. Iles, Springfield, Ill.....	30
Best cow, 3 years old and under 4, A. C. and G. Shropshire, Paris, Ky.....	50
Second best, J. H. Pickerill, Harristown, Ill.....	25
Best cow, 2 years old, and under 3, J. H. Pickerill, Harristown, Ill.....	40
Second best, H. Sadowsky, Indianola, Ill.....	20
Best heifer, 1 year old and under 2, H. Sadowsky, Indianola, Ill.	30
Second best, J. H. Pickerill, Harristown, Ill.....	15
Best heifer calf, B. F. Bedford, Paris, Ky.....	20
Second best, J. H. Pickerill, Harristown, Ill.....	10
Best cow, with calf, J. H. Pickerill, Harristown, Ill. ....	75
Second best, W. W. Thrasher, Connersville, Ind.....	40
Best Devon bull, Thomas Coats, Mount Airy, Ohio.....	40
Second best, J. H. Kenyon, Indianapolis.....	20
Best Devon cow, J. H. Kenyon, Indianapolis.....	30
Second best, J. L. Fisher, Southport, Ind.....	15
Best Ayrshire bull, S. K. Fletcher, Indianapolis.....	40
Best Ayrshire cow, A. Wallace & Merryman, Indianapolis.....	30
Second best, S. K. Fletcher, Indianapolis.....	15
Best Alderney bull, S. F. Pentecost, Zionsville.....	40
Second best, J. L. Fisher, Southport.....	20

## OXEN AND STEERS.

*Nine Entries*

Best pair oxen, 4 years old and over, S. E. Jacks, Cicero, Ind.....	\$30
Second best, C. R. Laws, Indianapolis.....	15
Best steer, 3 years old, and over Trotter & Christy, New Winchester, Hendricks county.....	30
Second best, Gen. Sol. Meredith, Cambridge City.....	15
Best steer, two years old and under 3, J. L. Shorthose, Danvers, Ill.....	20

## FAT CATTLE, SHEEP, AND HOGS.

*Thirty-Eight Entries.*

Best 3 fat steers, 4 years old and over, A. Tucker & Bro., Warsaw, Ind.....	\$75
Best 5 fat hogs, Rankin Baldrige, Hagerstown, Ind.....	40
Best 5 fat sheep, A. P. Wiley, Augusta, Ind.....	25
Best fat steer, A Tucker & Bro., Warsaw, Ind.....	20
Second best, Gen. Meredith, Cambridge City, Ind. ....	10
Best fat cow, W. W. Thrasher, Connersville, Ind.....	25
Second best, W. W. Thrasher, Connersville, Ind.....	15
Best fat sheep, A. P. Wiley, Augusta, Ind.....	10
Second best, H. H. Talbott, Crawfordsville, Ind.....	5
Best fat hog, S. D. Shields, Paddy's Run, Ohio.....	20
Second best, Rankin Baldrige, Hagerstown, Ind.....	10

## SWEEPSTAKES ON CATTLE.

*Fifty-Eight Entries.*

Best bull, any age, J. H. Pickerell, Harristown, Illinois, (weight, 2,032½ pounds) .....	\$100
Best cow, any age, A. C. & Gas. Shropshire, Paris, Kentucky, (weight, 1,702 pounds).....	100
Best bull, shown with 5 of his calves, 1 year old or under, J. H. Pickerell, Harristown, Illinois, (weight, 2,032½ pounds).....	100
Second best, Putnam County Stock Company, Greencastle, Ind..	50
Best herd of 1 bull and 4 cows or heifers, Harvey Sadowsky, Indiana, Illinois, (weight of bull, 2,270 pounds).....	200
Second best, J. H. Pickerell, Harristown, Illinois, (weight of bull, 2,505 pounds).....	100

## HOGS.

### LARGE BREEDS.

#### *One Hundred and Eighty-Eight Entries.*

Best boar, 2 years old and over, R. G. Hayworth, Liberty, Ind...	\$30
Second best, Magee & Brown, Otterbien, Benton county, Ind....	15
Best boar, 1 year old and under 2, S. F. Pentecost, Zionsville, Ind .....	25
Second best, W. P. Long, Clermont, Ind.....	10
Best boar, under 12 and over 6 months old, Spahr & McCoy, Centreville, Ind.....	20
Second best, Armstrong & Brother, Indianapolis.....	10
Best boar, under 6 months old, Rankin Baldrige, Hagerstown, Ind .....	10
Second best, Armstrong & Brother, Indianapolis.....	5
Best sow, 2 years old and over, S. D. Shields, Paddy's Run, Butler county, Ohio.....	20
Second best, F. S. Records, Franklin, Ind.....	10
Best sow, 1 year old and under 2, Spahr & McCoy, Centerville, Ind .....	20
Second best, Magee & Brown, Otterbien, Benton county, Ind....	10
Best sow, under 12 and over 6 months old, Magee & Brown, Otterbien, Ind.....	10
Second best, Armstrong & Brother, Indianapolis.....	5
Best sow, under 6 months old, H. C. Willett, Greenfield, Ind....	10
Second best, Armstrong & Brother, Indianapolis.....	5
Best 5 shoats under 6 months old, Rankin Baldrige, Hagerstown, Ind.....	20
Second best, S. D. Shields, Paddy's Run, Butler county, Ohio....	10
Best sow, and not less than 5 sucking pigs, Rankin Baldrige, Hagerstown, Ind.....	25
Second best, J. P. Forsyth, Franklin, Ind.....	10

### CHESTER WHITE STOCK.

Best chester white boar, 2 years old and over, D. McClintock, Solon, Ohio.....	\$20
Second best, W. M. Moore, Covington, Ind.....	10
Best boar, 1 year old and under 2, Thomas Coates, Mt. Airy, Hamilton county.....	15
Second best, E. R. Moody & Co., Eminence, Kentucky.....	10
Best sow, 2 years old and over, E. R. Moody, Eminence, Kentucky .....	15
Second best, O. L. Walker, Pendleton, Ind.....	10

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Best sow, 1 year old and under, E. R. Moody, Eminence, Kentucky .....	\$15
Second best, W. M. Moore, Covington, Ind.....	15

## BERKSHIRE STOCK.

*Sixty-Eight Entries.*

Best Berkshire boar, 2 years old and over, J. Kennedy, New Elizabeth, Ind.....	\$20
Second best, C. J. Bowen, Knightstown, Ind.....	10
Best boar, 1 year old and under 2, G. W. Byers, Nevada, Ohio...	15
Second best, Clay & Howerton, Paris, Kentucky.....	10
Best boar, under 12 and over 6 months old. G. W. Byers, Nevada, Ohio.....	10
Second best, Job Rodgers, Clayton, Ind.....	5
Best boar, 6 months old, J. N. Barker, Thorntown, Ind.....	8
Second best, Thomas Willhoit, Mechanicsburg, Ind.....	4
Best sow, 2 years old and over, J. N. Barker, Thorntown, Ind....	15
Second best, Job Rogers, Clayton, Ind.....	10
Best sow, 1 year old and under 2, G. W. Byers, Nevada, Ohio....	10
Second best, J. Hamilton, Colfax, Ind.....	5
Best sow, under 12 and over 6 months old, G. W. Byers, Nevada, Ohio .....	10
Second best, T. Willhoit, Mechanicsburg, Ind.....	5
Best sow, under six months old, J. N. Baker, Thorntown, Ind...	8
Second best, S. F. Pentecost, Zionsville, Ind.....	4
Best sow, with not less than 5 sucking pigs, J. N. Barker, Thorntown, Ind.....	15

## ESSEX STOCK.

*Ten Entries.*

Best Essex boar, under 12 and over 6 months old, S. F. Pentecost, Zionsville, Ind.....	\$10
Best boar, under 6 months old, A. P. Wiley, Augusta, Ind.....	8
Second best, G. W. Byers, Nevada, Ohio.....	4
Best sow, 1 year old and under 2, G. W. Byers, Nevada, Ohio.....	10
Second best, C. W. Sims, Danville, Ind.....	5
Best sow, under 12 and over 6 months old, C. W. Sims, Danville, Ind.....	10
Best sow, under 6 months old, S. F. Pentecost, Zionsville.....	8

## YORKSHIRE STOCK.

*Twenty-Two Entries.*

Best boar, 2 years old and over, O. P. Cobb & Son, Aurora, Ind...	\$20
Second best, E. R. Moody, Eminence, Ky.....	10



**PREMIUMS AWARDED.**

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Best boar, 1 year old and under 2, E. R. Moody, Eminence, Ky.,..	\$15
Second best, O. P. Cobb & Son, Aurora, Ind....	10
Best boar, under 12 and over 6 months, E. R. Moody & Co., Eminence, Ky.....	10
Second best, O. P. Cobb & Son, Aurora, Ind.....	5
Best boar, under 6 months old, E. R. Moody, Eminence, Ky.....	8
Second best, G. W. Byers, Nevada, Ohio.....	10
Best sow, 2 years old and over, O. P. Cobb & Son, Aurora, Ind..	15
Second best, G. W. Byers, Nevada, Ohio.....	10
Best sow, 1 year old and under 2, G. W. Byers, Nevada, Ohio....	10
Best sow, under 12 and over 6 months, E. R. Moody & Co., Eminence, Ky.....	10
Second best, G. W. Byers, Nevada, Ohio.....	5
Best sow, under 6 months old, E. R. Moody & Co., Eminence, Ky	8
Second best, G. W. Byers, Nevada, Ohio.....	4
Best sow, with not less than 5 sucking pigs, G. W. Byers, Nevada, Ohio .....	15

**SWEEPSTAKES ON HOGS.**

*One Hundred and Twelve Entries.*

Best boar, any age, J. M. Tullis, Attica, Ind.....	\$50
Best sow any age, Spahr & McCoy, Franklin, Ind.....	50
Best boar and 5 pigs, under 1 year old, Rankin Baldrige, Hagerstown, Ind.....	20

**S H E E P .**

**FINE WOOL.**

*Forty-Three Entries.*

Best buck, 2 years old and over, T. Taylor, Waynesville, Ill.....	\$15
Second best, T. Willhoit, Mechanicsburg, Ind.....	10
Best buck, 1 year old and under 2, Archibald Collins, Portland Mills, Ind.....	10
Second best, W. A. Banks, Door Village, Laporte county, Ind....	5
Best buck lamb, W. A. Banks, Door Village, Ind.....	5
Best ewe, 2 years old and over, J. W. Zigler, Rolling Prairie, Ind	10
Second best, T. Willhoit, Mechanicsburg, Ind.....	5
Best ewe, 1 year old and under 2, T. Taylor, Waynesville, Ill.....	10
Second best, J. W. Zigler, Rolling Prairie.....	5

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Best ewe lamb, W. A. Banks, Door Village, Ind.....	\$5
Best 5 lambs, W. A. Banks, Door Village, Ind.....	5

The undersigned Committee on Fine Wool Sheep, would respectfully report that we have been pleased to meet with a very fine exhibition in this department, in the hands of skillful and intelligent breeders, and only regret that the number and extent of premiums alone prevented the awarding of a worthy premium to each animal exhibited. We recommend two premiums on lambs outside of your list, and do believe that larger premiums are justified in this very necessary commercial commodity of fine wool.

C. FLETCHER,  
O. P. COBB,  
N. J. KEENEY.

#### LONG WOOL SHEEP.

##### *Forty-Two Entries.*

Best buck, 2 years old and over, Jacob Kennedy, New Elizabeth, Ohio .....	\$15
Second best, George F. Morgan, Elyria, Ohio.....	10
Best buck, under 2 years old, G. F. Morgan, Elyria, Ohio.....	10
Best buck lamb, G. F. Morgan, Elyria, Ohio.....	5
Best ewe, 2 years old and over, G. F. Morgan, Elyria, Ohio.....	10
Second best, Samuel Thoms, Canada.....	5
Best ewe, 1 year old and under, G. F. Morgan, Elyria, Ohio.....	15
Best ewe lamb, G. F. Morgan, Elyria, Ohio.....	5
Best five lambs, G. F. Morgan, Elyria, Ohio.....	15

#### LEICESTER OR LINCOLN SHEEP.

##### *Seventeen Entries.*

Best buck, 2 years old or over, Samuel Thoms, Canada.....	\$15
Second best, N. S. Hawkins, Cambridge City.....	10
Best buck, 1 year old and under 2, George F. Morgan, Elyria, O..	10
Second best, Ensminger & Bros., Danville.....	5
Best buck Lamb, Samuel Thoms, Canada.....	5
Best ewe, 2 years old and over, Samuel Thoms, Canada.....	15
Second best, G. P. Kunse, Mexico, Ind.....	5
Best ewe, 1 year old and under 2, Samuel Thoms, Canada.....	5
Second best, Samuel Thoms, Canada.....	5
Best ewe lamb, George F. Morgan, Elyria, Ohio.....	5

#### SOUTHDOWN SHEEP.

##### *Forty-seven Entries.*

Best buck, 2 years old and over, Gen. Sol. Meredith, Cambridge City .....	\$15
Second best, Robert Smith, Cleveland, Ind.....	10

**PREMIUMS AWARDED,**

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Best buck, 1 year old and under 2, Samuel Thoms, Canada.....	\$10.
Second best, S. Meredith, Cambridge City.....	5.
Best buck lamb, John Middleton, Eminence, Ky.....	5
Best ewe, 2 years old and over, John Middleton, Eminence, Ky..	10
Second best Samuel Thoms, Canada.....	5
Best ewe, 1 year old and under 2, S. Meredith, Cambridge City...	10
Second best, S. Meredith, Cambridge City.....	5
Best ewe lamb, John Middleton, Eminence, Ky.....	5
Best 5 lambs, John Middleton, Eminence, Ky.....	15

**SHEEP FOR MUTTON AND WOOL.**

*Twenty-nine Entries.*

Best buck, 2 years old and over, Ensminger & Bro., Danville.....	\$15.
Second best, G. F. Morgan, Elyria, Ohio.....	10.
Best buck, 1 year old and under 2, G. F. Morgan, Elyria, Ohio...	10
Second best, Robert Smith, Cleveland, Ind.....	5.
Best buck lamb, Ensminger & Bro., Danville.....	5
Best ewe, 2 years old and over, Thomas Taylor, Waynesville, Ill..	5
Second best, Thomas Taylor, Waynesville, Ill.....	5.
Best ewe, 1 year old and under 2, Samuel Thoms, Canada....	10.
Second best, Thomas Taylor, Waynesville, Ill.....	5
Best ewe lamb, Ensminger & Bro., Danville.....	5
Best five lambs, Ensminger & Bro., Danville.....	15

**SWEEPSTAKES ON FINE WOOL SHEEP.**

*Eleven Entries.*

Best buck having 5 best lambs, Thomas Taylor, Waynesville, Ill.	\$20
Best ewe, Thomas Willhoit, Mechanicsburg,.....	10

**SWEEPSTAKES ON LONG WOOL SHEEP.**

*Twelve Entries.*

Best buck having 5 best lambs, G. F. Morgan, Elyria, Ohio.....	\$20
Best ewe, G. F. Morgan, Elyria, Ohio.....	10

**SWEEPSTAKES FOR MIDDLE WOOL SHEEP.**

*Eighteen Entries.*

Best buck having five best lambs, John Middleton, Eminence, Ky .....	\$20
Best ewe, any age, Thomas Taylor, Waynesville, Ill.....	10

## POULTRY.

*One Hundred and Sixty-three Entries.*

Best pair black Spanish, L. H. McKernan, Indianapolis.....	\$5
Best pair light Brahams W. H. Fry, Indianapolis.....	5
Best pair dark Brahams, Dodge & Kelley, Ravenna, Ohio.....	5
Best pair buff Cochins, J. A. McKinney, Indianapolis.....	5
Best pair partridge Cochins, W. H. Fry, Indianapolis.....	5
Best pair Polands, L. H. McKernan, Indianapolis.....	5
Best pair Dorkings, L. H. McKernan, Indianapolis .....	5
Best African Bantams, Green & Quinius, Indianapolis.....	5
Best pair silver bantams, C. W. Ludlow, Mount Carmel, Ohio....	5
Best pair chickens, any kind, W. H. Fry, Indianapolis.....	5
Best pair tame geese, L. H. McKernan, Indianapolis.....	5
Best pair wild geese, L. H. McKernan, Indianapolis.....	5
Best pair turkeys, L. H. McKernan.....	5
Best pair common ducks, Green and Quinius, Indianapolis.....	5
Best pair Muscovy ducks, W. G. Merryman, Indianapolis.....	5
Best pair Guinea fowls, Horace Wallace, Indianapolis.....	5
Best pair game fowls, Dodge and Kelly, Barr Post office, Ohio....	5
Best Houdon, J. T. Williamson, Thorntown, Ind.....	5
Best Dominique, L. H. McKernan.....	5
Best collection of poultry of any kind, L. H. McKernan, Indianapolis.....	10

## MECHANICAL DEPARTMENT.

## PLOWS AND PLOWING.

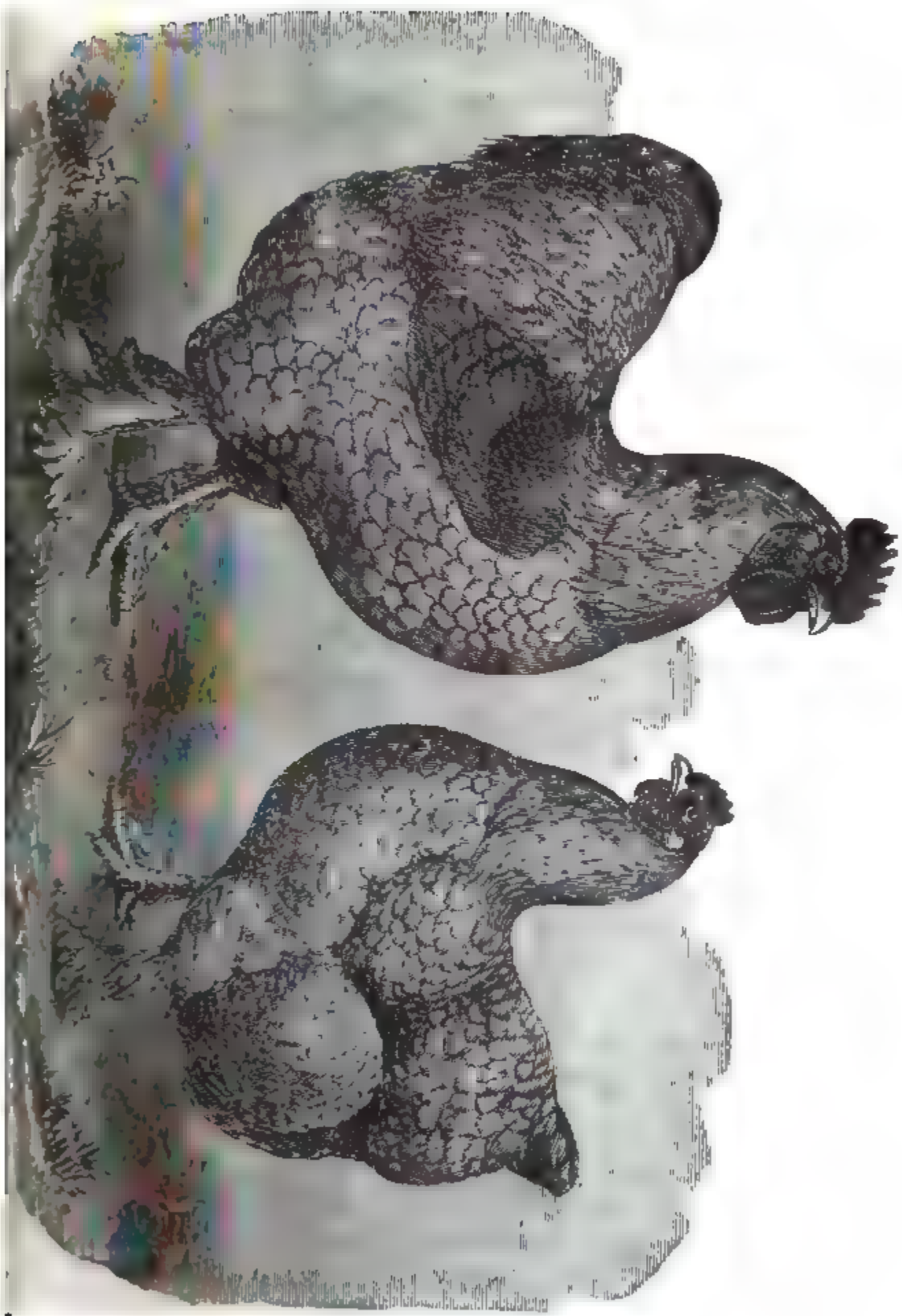
*Ninety-Four Entries.*

AWARDS MADE AT JUNE TRIAL.

Best plow for general purposes, S. Horney &amp; Co., Richmond, Ind.. \$20

Weight, 131½ pounds; draft, 20½ pounds.

The lightest plow was entered by Houck, Spencer &amp; Co., Indianapolis, weight 88½ pounds, draft 526½ pounds; and the heaviest by





Sol. Beard, of the Lafayette Plow Works, weight 136½ pounds, draft 390½ pounds.

Best arrangement for attaching three horses, Sol. Beard, Lafayette Plow Works ..... \$5

Best plow for alluvial or muck soil, Bucher, Gibbs & Co., Canton, Ohio ..... 15

Best sod plow, Sol. Beard, Lafayette Plow Works..... 15  
Weight, 137 pounds; draft, 666½ pounds.

Best hill-side plow, S. Horney & Co., Richmond, Ind ..... 5

Best gang plow, S. Horney & Co., Richmond, Ind..... 10

Best stubble plow, Mause, Breneman & Co., Dayton, Ohio..... 10  
Weight, 111½ pounds; draft, 375 pounds.

Best steel plow, Lafayette Plow Works..... 10

Best cast iron plow, M. L. Gibbs, Canton, Ohio..... 10

Best subsoil plow, Lafayette Plow Works ..... 10

Best plowman, E. F. Norwood, Indianapolis, (Moline Plow Co.'s special premium)..... Moline Plow

Best specimen of sod plowing, B. Lloyd, Richmond, Ind., (Sol. Beard's special premium)..... L. F. P. W. Plow, val. \$25

Best display and greatest variety of plows, (shown at Fair,) S. Horney & Co., Richmond ..... Silver Medal and \$20

REMARKS BY THE AWARDED COMMITTEE.

Your Committee on Plows and Plowing met on the grounds selected for the trial, where they found a splendid display of plows in competition for the prizes.

In making the tests, the rules adopted by the Board were as strictly adhered to as practicable, the several implements being weighed and the draft tested by the dynamometer.

The Moline Plow Company did not enter for competition but for inspection only, but we do not hesitate to speak favorably of the material and construction of these plows, and their performance on trial.

Your Committee feels that justice to unsuccessful competitors, with very few exceptions, demands the acknowledgment that the contests were so close that we regreted not having more premiums at our disposal.

In the contest for the Moline Plow Company's special premium of a Moline Plow for the best plowman, and the special premium of Sol. Beard, of the Lafayette Plow Works, of a \$25 plow, for the best specimen of sod plowing, the trial for the former was made in stubble ground by seven competitors, and for the latter, in sod ground by five competitors.

In each case the committee retired from view during the trial, and formed their judgment exclusively from the work performed. The contest was close, and demonstrated that the competitors had spent more time in the field than in the billiard room.

In closing this report, we take great pleasure in attesting the courteous demeanor of the exhibitors toward each other, and to the Committee, demonstrating that true politeness may be cultivated in the field as well as in the parlor.

Being thus surrounded, and having the aid of your efficient Superintendent, Mr. George W. Reeves, whose practical knowledge of such trials, added to his motto of "fair play," rendered our three and a-half days of arduous labor, more pleasant than otherwise.

T. N. LINK,  
ALFRED WALKER,  
B. J. KEATON,  
Committee.

### IMPLEMENTS FOR PLANTING AND CULTIVATION OF CROPS.

*Ninety-Four Entries.*

#### AWARDS MADE AT JUNE TRIAL.

- Best walking two-horse corn plow, Wayne Agricultural Works, Dublin, Ind..... \$10  
Superiority of work, and light draft, combined with center draft.
- Best riding two-horse corn plow, Walker & Piatt, Laporte, Ind.. \$10  
Superior work, and arrangement of the seat, by which it may be readily converted into a walking plow.
- Best one-horse corn plow, S. Horney & Co., Richmond, Ind..... \$5
- Best double shovel plow, A. B. Reeves, Knightstown, Ind..... 5  
Superior construction and work.
- Best single shovel plow, S. Horney & Co., Richmond, Ind..... 2
- Best cultivator, Houck, Spencer & Co., Indianapolis..... 5  
Superior work.
- Best two-horse grain drill, Thomas, Ludlow & Rodgers, Springfield, Ohio..... Diploma, and 20  
Regularity of the double force feed, and combination of spring, and pins for keeping the hoes in position.
- Best one-horse 5 hoe wheat drill, Hoosier Drill Company, Milton, Ind..... Diploma and \$10  
Simplicity of construction and regularity of feed.
- Best field roller, S. B. Maun, Darrrtown, Ohio..... Diploma and 10  
Greater weight without additional draft.
- Best harrow, D. L. Jacques, Hudson, Michigan..... 5  
Center hinge, adjustable teeth, and light draft.
- Best two-horse corn planter, Springfield Manufacturing Company, Springfield, Illinois..... Silver Medal  
Substantial construction, and regularity of dropping.
- Best one-horse corn-planter, Noah Mendenhall, Greensburg, Ind ..... \$5  
Simplicity of construction, and regularity of dropping.



Best one-horse corn drill, Hoosier Drill Company, Milton, Indiana.....	Diploma and \$5
Great regularity of feed.	
Best two-horse corn drill, Remy & Co., Hamilton, Ohio.....	8
Regularity in dropping.	
Best lawn mower, Houck, Spencer & Co., Indianapolis, Ind..	Diploma
Good machine and good work.	
Display and variety of agricultural implements, Houck, Spencer & Co., Indianapolis, Ind.....	Silver Medal and 30

JONATHAN FOLTZ,  
R. P. C. BARWICK,  
JOHN PIERSON.  
Committee.

FARM MACHINERY.

*Thirty-Four Entries.*

Best Horse hay rake, B. C. Taylor Manufacturing Company, Dayton, Ohio.....	\$5
Best horse hay pitcher, Case & Parker, Indianapolis, Ind.....	5
Best fanning mill, E. Michael & Co., Laporte, Ind.....	Silver Medal
Best grain screen, Houck, Spencer & Co., Indianapolis, Ind.....	5
Best corn sheller, M. & J. Rumely, Laporte.....	5
Best grass seed sower, N. J. Keeney, Florence, Ind.....	3
Best combined hay rake and loader, Thomas Griffin, Perrysville, Ohio.....	Bronze Medal
Best power corn sheller and separator, M. and J. Rumely, Laporte, Ind.....	\$5.
Best eight-horse power, Rhinehart, Ballard & Co., Springfield, Ohio.....	Bronze Medal.
Best two-horse power, M. and J. Rumely, Laporte, Ind..	Bronze Medal
Best hay press, C. Barney, Indianapolis.....	Diploma

MILLS, PRESSES, ETC.

*Six Entries.*

Best smut machine, Bloomington (Indiana) Manufacturing Company .....	Bronze Medal
Best cider mill, R. Butterworth, Trenton, N. J.....	Diploma and \$5
Best cider press, W. H. Ragan, Clayton, Ind.....	Diploma and 5

DOMESTIC IMPLEMENTS.

*Twenty-Eight Entries.*

Best Churn, J. W. McClure, Indianapolis.....	\$5
Best clothes wringer, Providence Tool Co., R. I.....	3
Best apple parer, Hildebrand & Fugate, Indianapolis.....	1
Best step-ladder, Cathcart & Cleland, Indianapolis.....	1

Best clothes rack, Richards & Fox, Buchanan, Mich.....	\$1
Best washing machine, Calkin Bros. & Co., Chicago, Ill.....	5

#### ENGINES, BRICK, TILE AND DITCHING MACHINES.

##### *Twenty-One Entries.*

Best stationary engine, twenty-horse power, Greenleaf Machine Company, Indianapolis.....	Silver Medal and \$50
Best portable engine, Gaar, Scott & Co., Richmond, Ind..	Silver Medal
Best rotary blower, Greenleaf Machine Co., Indianapolis.....	Diploma
Best drain tile machine, H. Brewer & Co., Tecumseh, Mich...	Sil. Med
Best ditching machine, William Burton, Kankakee, Ill...	Silver Medal
Best brick machine, H. Brewer & Co., Tecumseh, Mich..	Silver Medal
Best tubular boiler, Greenleaf Machine Company, Indianapolis.....	Bronze Medal
Best head block for saw mills, Sinker, Davis & Co., Indianapolis.....	Bronze Medal
Best lime extractor and water heater, Sinker, Davis & Co., Indianapolis.....	Bronze Medal
Best steam engine governor and valve, Sinker, Davis & Co., Indianapolis.....	Silver Medal

#### WOOD WORKING MACHINERY.

##### *Six Entries.*

Best stave machine, Chandler & Taylor, Indianapolis.....	Bronze Med
Best shingle machine, Chandler & Taylor, Indianapolis....	Bronze Med
Best scroll sawing machine, B. J. Camp, Marion, Ohio.....	Diploma
Best circular saw and frame, Chandler & Taylor, Indianapolis..	Diploma
Best broom-making machine, J. W. Bradshaw, Indianapolis..	Diploma
and.....	\$5

#### FARM IMPLEMENTS.

##### *Thirty-Six Entries.*

Best wood pump, Martin Bullimen, Tipton, Ind.....	\$5
Best pump of any kind, Greenleaf Machine Co., Indianapolis....	5
Best tube well in operation, R. R. Rouse, Indianapolis...Dip. and	5
Best bee-hive, A. Wilkinson, Greensburg, Ind.....	Diploma
Best farm gate, John C. Long, Eaton, Ind.....	5
Best power cutting box, Houck, Spencer & Co., Indianapolis..	Diploma
Best stump puller, Isaac Lawrence, Bridgeport, Ind.....	Diploma
Best wheelbarrow, Seibert & Son, Indianapolis.....	2
Best road scraper, W. Burton, Kankakee, Ill.....	2
Best hand cutting box, Thomas Hazzard, Wilmington, Ohio..	Diploma
Best hedge trimmer, Hildebrand & Fugate, Indianapolis.....	2
Best implement for sheep shearing, Hilderbrand & Fugate, Indianapolis.....	2

WOODEN AND WILLOW WARE.

*Six Entries.*

Best lot baskets, A. Wallace, Indianapolis.....	\$2
Best one dozen wooden pails, A. Wallace, Indianapolis.....	2
Best nest of wash tubs, A. Wallace, Indianapolis.....	2
Best one-half dozen corn brooms, J. W. Bradshaw, Indianapolis..	2
Best specimen basket, willow, A. Wallace, Indianapolis.....	2
Best display of cooper ware, W. H. M. Martin, Jamestown, Ind..	3

EDGE TOOLS, WORKED METAL AND HARDWARE.

*Twenty-Three Entries.*

Best assortment of cutlery, (Indiana manufacture) Diamond Cutlery Company, Richmond.....	Bronze Medal
Best collection of saws, E. C. Atkins & Co., Indianapolis..	Silver Med.
Best cross-cut saw, Hildebrand & Fugate, Indianapolis.....	Diploma
Best Smoothing irons, Hildebrand & Fugate, Indianapolis.....	\$1
Best meat cutter, Hildebrand & Fugate, Indianapolis.....	1
Best knife sharpener, Hildebrand & Fugate, Indianapolis.....	1
Best cooking stove, Mothershead & Morris, Indianapolis.....	10
Best parlor stove, Mitchell, Stevenson & Co., Pittsburg, Pa.....	5
Best cooking stove for coal, Mothershead & Morris, Indiana- polis.....	Diploma
Best case of files, Hildebrand & Fugate, Indianapolis.....	5
Best wrench, any kind, Hildebrand & Fugate, Indianapolis.....	1
Best sash supporter and fastener, W. A. Ford, Greensburg, Ind..	1
Best axe, Hildebrand & Fugate, Indianapolis.....	1
Best mattock, Hildebrand & Fugate, Indianapolis.....	1
Best pair horse shoes, J. Kenton, Hillsboro.....	1
Best gate latch, J. C. Long, Eaton, Ind.....	1
Best collection bird cages, Charles Mayer, Indianapolis.....	1
Best collection reaper and mower knives, Long & Alstatter, Ham- ilton, Ohio.....	Silver Medal
Best specimen blacksmithing, Seibert & Son, Indianapolis.....	5

EVAPORATORS, SCALES, BELLS, ETC.

*Twelve Entries.*

Best collection of scales, W. P. Gallup, Indianapolis.....	Diploma
Best cattle or hay scales, Victor Scale Co., Moline, Ill.....	Diploma
Best collection of bells, Houck, Spencer & Co., Indianapolis.....	\$5
Best apparatus for cooking food for stock, P. P. Mast & Co., Springfield, Ohio.....	Diploma
Best refrigerator, Ebert & Owen, Indianapolis.....	Bronze Medal
Best portable self-supporting fence, B. F. Mears, Washington, Ind.....	Diploma

## LEATHER AND LEATHER MANUFACTURES.

*Sixteen Entries.*

Best collection of leather, Hide, Leather and Belting Company, Indianapolis.....	\$10
Best collection leather belting, Hide, Leather and Belting Company, Indianapolis.....	Diploma and 10
Best double carriage harness, Frauer & Bieler, Indianapolis . ....	20
Best single harness, Frauer & Bieler, Indianapolis .....	10
Best pair boots, G. C. Steinhauer, Indianapolis.....	2
Best collection of boots and shoes manufactured in Indiana, G. C. Steinhauer, Indianapolis.....	20
Best trunk, R. L. Shilling, Indianapolis.....	5
Best valise, R. L. Shilling, Indianapolis.....	5
Best braided rope halter, Frauer & Bieler, Indianapolis.....	1
Best hame fastening, Frauer & Bieler, Indianapolis. ....	1
Best horse collar, Charles Wiegart, Richmond.....	1

## INDIANA MINERALS, BUILDING STONE, ETC.

*Eight Entries.*

Best worked marble, Lewis, Whitehead & Co., Indianapolis,	Silver Medal
Best Indiana coal, Niblock, Merrifield & Co., Indianapolis....	Diploma
Best collection of drain tiles, John M. McCullum, Indianapolis...	\$10
Best collection window glass, of Indiana manufacture, J. B. Ford, New Albany, Ind.....	Silver medal
Best polished plate glass, J. B. Ford, New Albany, Ind..	Silver medal
Best collection rolled or hammered glass, J. B. Ford, New Albany, Ind .....	\$25

## INDIANA GLASS AND IRON.

*Two Entries.*

Best collection nuts, bolts, etc., S. H. Wright & Co.....	Silver medal
Best glassware, Indianapolis Glass Works, Indianapolis.....	\$25

## CHEMICALS—INDIANA MANUFACTURE.

*Twenty-Four Entries.*

Best varnish, Mears & Lilly, Indianapolis.....	\$3
Best copal varnish, Mears & Lilly, Indianapolis.....	2
Best linseed oil, F. A. Boyd, Indianapolis.....	3
Best lard oil, F. A. Boyd, Indianapolis.....	2
Best white lead, F. A. Boyd, Indianapolis.....	2
Best hard soap, Mrs. M. Caylor, Indianapolis.....	2
Best soft soap, Ellen R. Marvel, Royaltan.....	2

Best toilet soap, Mrs. A. Wallace, Indianapolis.....	\$2
Best display of soap, Mrs. M. Caylor, Indianapolis.....	2
Best display of mineral paints, F. A. Boyd, Indianapolis.....	5
Best coal oil, F. A. Boyd, Indianapolis.....	5
Best machine oil, F. A. Boyd, Indianapolis.....	2
Best display of oil, F. A. Boyd, Indianapolis.....	5

CARRIAGES, WAGONS, ETC.

*Thirty-Three Entries.*

Best two-seated carriage, Shaw & Lippincott Manufacturing Company, Indianapolis.....	\$40
Best one-seated top buggy, George, Lowe, Indianapolis.....	25
Best one-seated open buggy, George Lowe, Indianapolis.....	15
Best two-seated spring wagon, Dovey & Bro., Knightstown, Ind..	15
Best Sulky, Pennoyer, Shaw & Co., Chicago.....	5
Best set of carriage wheels, Woodburn Sarven Wheel Company, Indianapolis.....	Diploma
Best carriage coupling, Shaw & Lippincott Manufacturing Company, Indianapolis.....	5
Best two-horse wagon, J. P. Forsythe, Franklin, Ind... ..	20
Best collection of carriage and wagon material, Woodburn Sarven Wheel Company, Indianapolis.....	10
Best set carriage hubs, Woodburn Sarven Wheel Company, Indianapolis.....	3
Best set wagon hubs, Woodburn Sarven Wheel Company, Indianapolis.....	3
Best collection carriages, wagons, buggies, etc., Shaw & Lippincott Manufacturing Company, Indianapolis.....	30
Best open top buggy without finish, Shaw & Lippincott Manufacturing Company, Indianapolis.....	10

FURNITURE.

*Twenty-Nine Entries.*

Best parlor set, 8 pieces, Speigel, Thoms, & Co., Indianapolis.....	\$20
Best chamber set, 3 pieces, Mitchell & Rammelsberg, Indianapolis.....	20
Best dining-room set, 8 pieces, Mitchell & Rammelsberg, Indianapolis.....	20
Best bookcase, Mitchell & Rammelsberg, Indianapolis.....	5
Best bookcase and secretary combined, Mitchell & Rammelsberg, Indianapolis.....	5
Best library table, Mitchell & Rammelsberg, Indianapolis.....	5
Best wardrobe, Mitchell & Rammelsberg, Indianapolis.....	5
Best office desk, Mitchell & Rammelsberg, Indianapolis.....	5
Best office chair, A. H. Andrews & Co., Indianapolis.....	2
Best office table, A. H. Andrews & Co., Indianapolis.....	2

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Best spring mattress, Mitchell & Rammelsberg, Indianapolis.....	\$5
Best collection of cabinet-ware, Mitchell & Rammelsberg, Indianapolis.....	Silver Medal
Best Schoolhouse furniture, A. H. Andrews & Co., Indianapolis.....	Diploma

## MUSICAL INSTRUMENTS.

*Eight Entries.*

All the musical instruments placed on exhibition were entered on the understanding that there should be no competition for premiums.

Best musical instrument band, Charles A. Jones, Fort Wayne, Ind., \$50, and a special premium offered by Benham Brothers, consisting of a silver cornet, valued at..... \$60

The committee, on making the award, expressed their opinion that the band was the best in the State, or in the West.

## FURS, WEARING APPAREL, ETC.

*Four Entries.*

Best collection of men's clothing, L. I. Mossler & Bro., Indianapolis.....	\$5
Best chart for cutting garment, Mrs. L. L. Jackson, Indianapolis..	Dip.
Best specimens of printing, Wright, Baker & Co., Indianapolis.....	Diploma

## SCIENTIFIC INSTRUMENTS.

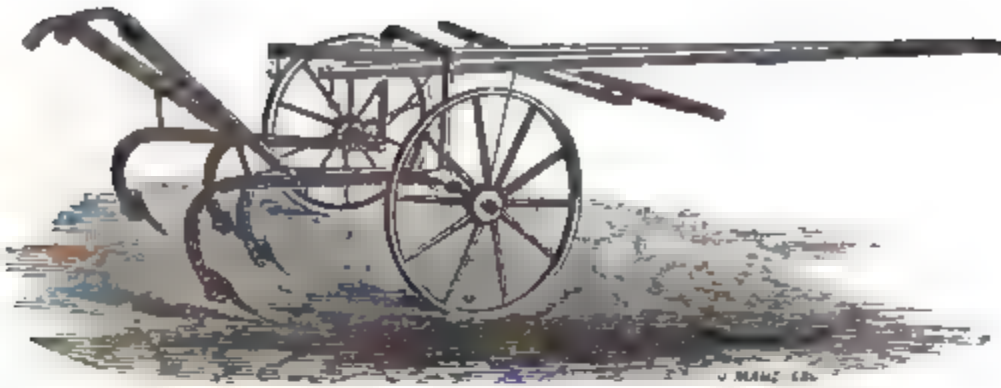
*Four Entries.*

Best lightning rod, David Munson, Indianapolis.....	Bronze Medal
Best invention for artificial light, W. L. Wood & Co., Indianapolis.....	Silver Medal
Best portable gas works, in operation, W. L. Wood & Co., Indianapolis.....	Silver Medal
Best silver plating, J. M. Washington, Indianapolis.....	Diploma

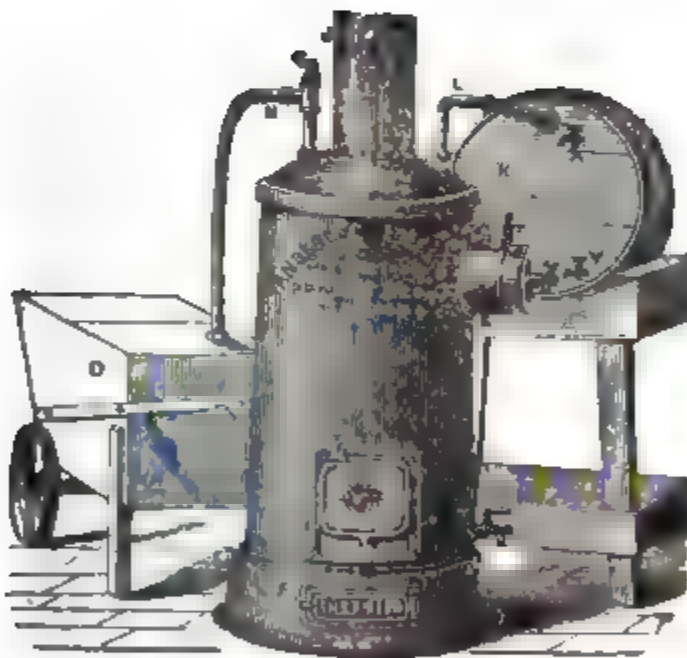
## DOMESTIC MANUFACTURES MADE BY HAND, WITHIN THE YEAR.

*Seventy Entries.*

Best ten yards rag carpet, Mrs. J. Pride, Knightstown.....	\$10
Best ten yards woolen carpet, R. S. Cookson, Indianapolis.....	15
Best double coverlet, woolen, Miss Nannie Dungan, Greenwood, Ind.....	5
Best wool knit stocking, Susan H. Sharon, Covington, Ind.....	2
Best wool socks, Susan H. Sharon, Covington, Ind.....	2
Best wool knit mittens, Melinda Crawford, Clayton.....	2
Best woolen comfort, Mrs. L. Recker, Indianapolis.....	2
Best pound woolen yarn, Mrs. C. B. Davidson, Rochester.....	2



**WESTERN WALKING CULTIVATOR.**



**ANDERSON AGRICULTURAL STEAMER.**



**MOLINE PLOW.**





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Best foot mat, Mrs. Gilson, Greensburg.....	\$2
Best ten yards jeans, Maggie McCastle, Franklin.....	10
Best ten yards table linen, Miss Ann Cox.....	10
Best ten yards plain linen, Maggie McCastle.....	10
Best ten yards linsey, Mrs. C. B. Davidson, Rochester.....	10
Best flax thread, Mrs. Jane Hull, Indianapolis.....	2
Best cotton knit socks, Mrs. N. W. Montgner, Acton.....	2
Best cotton knit stockings, Mrs. Deloss Wood, North Madison....	2
Best ten yards plaid flannel, Mrs. C. B. Davidson, Rochester.....	10
Best ten yards plain flannel, Mrs. C. B. Davidson, Rochester.....	10

DOMESTIC MANUFACTURES, MADE BY MACHINERY.

*Thirty-Eight Entries.*

Best piece jeans, Meritt & Coughlen, Indianapolis.....	\$5
Best piece of plaid flannel, C. E. Geisendorff & Co., Indianapolis	10
Best piece of plain flannel, C. E. Geisendorff & Co., Indianapolis	10
Best piece satinet, Meritt & Coughlen, Indianapolis.....	5
Best piece fancy cassimere, Meritt & Coughlen, Indianap- olis.....	Silver Medal
Best piece doeskin, Meritt & Coughlen, Indianapolis.....	10
Best piece Melton, Meritt & Coughlen, Indianapolis.....	10
Best piece repellant, Meritt & Coughlen, Indianapolis...	Silver Medal
Best piece fulled jeans, Meritt & Coughlen, Indianapolis.....	5
Best piece tweed, Meritt & Coughlen, Indianapolis.....	5
Best pair white blankets, C. E. Geisendorff & Co., Indianap- olis.....	Silver Medal
Best pair fancy blankets, C. E. Geisendorff & Co., Indianap- olis.....	Silver Medal
Best five pounds blue yarn, C. E. Geisendorff & Co., Indianapolis	3
Best five pounds fancy yarn, C. E. Geisendorff & Co., Indianapolis	3
Best collection of dry goods, Meritt & Coughlen, Indianap- olis.....	Silver Medal

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AGRICULTURAL DEPARTMENT.

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VEGETABLES.

*Sixty-Six Entries.*

Best three cauliflowers, George W. Butcher, Indianapolis.....	\$2
Best six broccoli, John Marvel, Royalton, Ind.....	2
Best six vegetable eggs, George W. Butcher, Indianapolis.....	2

Best six cucumbers, John Marvel, Royalton, Ind.....	\$2
Best peck white beans, John Marvel, Royalton, Ind.....	2
Best two quarts Lima beans, H. A. Hockett, Clayton, Ind.....	1
Best two quarts garden peas, dry, George W. Butcher, Indianapolis.....	2
Best two quarts field peas, dry, George W. Butcher, Indianapolis	2
Best half peck peppers, for pickling purposes, George W. Butcher, Indianapolis.....	2
Best peck tomatoes, George W. Butcher, Indianapolis.....	3
Best collection of tomatoes, George W. Butcher, Indianapolis....	5
Best half dozen ears green sweet corn, George W. Butcher, Indianapolis.....	2
Best half peck dry sweet corn, George W. Butcher, Indianapolis	2
Best three squashes, of any kind, John Marvel, Royalton, Ind....	2
Three Yankee pumpkins, George W. Butcher, Indianapolis.....	2
Best three sweet pumpkins, John Marvel, Royalton, Ind.....	2
Best half dozen nutmeg melons, John Marvel, Royalton, Ind.....	2
Best three drum-head cabbages, John Marvel, Royalton, Ind.....	2
Best three flat Dutch cabbages, George W. Butcher, Indianapolis.....	2
Best three cabbages of any kind, John Marvel, Royalton, Ind....	2
Best three water mellons, George W. Butcher, Indianapolis.....	2
Best collection of vegetables, by one exhibitor, Geo. W. Butcher, Indianapolis.....	15
Second best collection, John Marvel, Royalton, Ind.....	7

## ROOT CROPS.

*Fifty-Six Entries.*

Best half bushel turnips, Robert Schroeder, Plymouth, Ind.....	\$2
Best dozen parsneps, G. W. Butcher, Indianapolis.....	2
Best dozen stalks celery, George W. Butcher, Indianapolis.....	2
Best dozen radishes, H. Weghorst, Indianapolis.....	2
Best dozen carrots, George W. Butcher, Indianapolis.....	2
Best dozen roots salsify, George W. Butcher, Indianapolis.....	2
Best dozen roots horseradish, George W. Butcher, Indianapolis..	2
Best half dozen red beets, George W. Butcher, Indianapolis.....	2
Best half dozen turnip beets, John Marvel, Royalton, Ind.....	2
Best dozen sugar beets, W. G. Merryman, Indianapolis.....	2
Best dozen red onions, John Marvel, Royalton, Ind.....	2
Best half peck yellow onions, George W. Butcher, Indianapolis..	2
Best half peck white onions, George W. Butcher, Indianapolis...	2
Best dozen turnip radishes, George W. Butcher, Indianapolis....	1
Best dozen long radishes, George W. Butcher, Indianapolis.....	1
Best display of onions, in variety, and quality, George W. Butcher, Indianapolis.....	5

POTATOES.

*Sixty-Six Entries.*

Best pink peach blows, T. T. Glieswell, 'Traders' Point, Ind.....	\$3
Best white peach blows, John Marvel, Royalton, Ind.....	3
Best early rose, A. B. Shelleday, Danville, Ind.....	3
Best Prince Albert, John Marvel, Royalton, Ind.....	3
Best early Goodrich, A. B. Shelleday, Danville, Ind.....	3
Best early Harrison, John Marvel, Royalton, Ind.....	3
Best pink eyes, John Marvel, Royalton, Ind.....	3
Best Shaker russets, John Marvel, Royalton, Ind.....	3
Best half bushel any variety, H. A. Hockett, Clayton, Ind.....	5
Best half bushel sweet potatoes, John Wright, Washington, Ind..	3
Best ten varieties Irish potatoes, (one peck each,) A. B. Shelleday, Danville, Ind .....	10

GRAIN AND SEEDS.

*One Hundred and Seventy-Two Entries.*

Best early field dent corn, John Marvel, Royalton, Ind .....	\$10
Best half bushel yellow corn in ear, Hamlin & Wright, Indianapolis .....	10
Second best, Wm. Peggs, Greenwood, Ind.....	5
Best half bushel white corn in the ear, Isaac Smock, Southport, Ind.....	10
Second best, W. A. Ennis, Clermont, Ind.....	5
Best half bushel hominy corn, T. C. Smock, Southport, Ind.....	5
Best display and variety of wheat, Jacob Whitesell, Nora, Ind...	20
Best half bushel white wheat, A. B. Shelleday, Danville, Ind.....	10
Second best, W. C. Welton, Vincennes, Ind.....	5
Best half bushel red wheat, Alfred Welton, Vincennes, Ind.....	10
Second best, W. A. Ennis, Southport, Ind.....	5
Best half bushel spring wheat, John Marvel, Royalton, Ind.....	10
Second best, A. B. Shelleday, Danville, Ind.....	5
Best half bushel rye, Henry Comstock, Liberty Mills, Wabash county, Ind.....	5
Best half bushel oats, Isaac Smock, Southport, Ind.....	5
Best half bushel buckwheat, A. F. Lower, Royalton, Ind.....	10
Best half bushel barley, John Morrison, Middlefork, Ind .....	5
Best half bushel flax seed, F. M. Black, Brownville, Ind.....	5
Best half bushel millet seed, A. B. Shelleday, Danville, Ind.....	5
Best half bushel timothy seed, Alfred Welton, Vincennes, Ind...	5
Best half bushel Kentucky blue grass seed, Alfred Welton, Vincennes, Ind.....	5
Best half bushel English blue grass seed, John Marvel, Royalton, Ind .....	5
Best half bushel red-top grass seed, Alfred Welton, Vincennes, Ind.....	5

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Best half bushel red clover seed, Alfred Welton, Vincennes, Ind.	\$10
Best sample 25 pounds of leaf tobacco, Anthony Robinson, Indianapolis.....	5
Best sample 10 pounds broom corn, J. W. Bradshaw, Indianapolis	5

## FIELD CROPS OF INDIANA.

*Five Entries.*

The State Board of Agriculture decided to award premiums to the following parties, having set aside the rule previously adopted, that the award should not be made until January, the required statements, properly attested, being on file with the Secretary. He will thus be enabled to incorporate the names of the parties taking the premiums in the present annual report.

Best five acres of wheat, John W. Canary, New Lebanon, Sullivan county, Ind., amount per acre 35 bushels and 11 pounds... \$50

John Morrison, of Middle Fork, Clinton county, Ind., made an affidavit that he had produced 40 bushels and 32 pounds on an acre; but as he failed to produce a specimen of grain, and had merely estimated that the yield was the same on the remaining four acres, he was debarred from competition.

Best five acres of corn, Alfred Welton, Vincennes, Ind., amount in all 590 bushels and 60 pounds..... \$50

Best one acre potatoes, W. G. Merryman, Indianapolis, amount 154 bushels..... 25

Best five acres timothy, Alfred Welton, Vincennes, Ind., amount in all 17 tons and 460 pounds..... 25

Best five acres of oats, Alfred Welton, Vincennes, Ind., amount in all 386 bushels and 14 pounds..... 25

Experienced agriculturists assert that this yield of field crops demonstrate that Indiana should take rank with the most fertile States in the Union.

## BUTTER, CHEESE, SUGAR, HONEY, BREAD, ETC.

*Seventy-five Entries.*

Best 5 pounds of butter, made in June, Mrs. G. W. Merryman, Indianapolis ..... \$10

Second best, Eunice Gibson, Greensburg, Ind..... 5

Best 5 pounds butter, made in September, Mrs. G. W. Merryman, Indianapolis..... 10

Second best, Mrs. Benjamin Shanks, Indianapolis..... 5

Best cheese, 10 pounds or over, Mrs. Thompson, Indianapolis... 10

Second best, Mrs. Mary Bowsman, Danville, Ind..... 5

Best 5 pounds maple sugar, Mrs. P. D. Stagg, Greensburg, Ind... 2

Best half gallon maple molasses, Mrs. P. D. Stagg, Greensburg, Ind ..... 2

Best 5 pounds honey in comb, C. S. Horton, Rochester, Ind..... 5

Best display of honey, W. A. Horton, Rochester, Ind.....	\$10
Best loaf wheat bread, milk or salt, etc., Mrs. Benjamin Shanks, Indianapolis.....	3
Second best, Miss Alice Shanks, Indianapolis.....	5
Best loaf wheat bread, yeast rising, Miss Alice Shanks, Indian- apolis .....	3
Second best, Mrs. Benjamin Shanks, Indianapolis.....	2
Best loaf corn bread, Mrs. Rachel Koontz, Indianapolis.....	2
Best sample of cake, Mary Bowsman, Danville, Ind .....	2
Best collection of cake by one exhibitor, Lizzie Akin, Indianap- olis.....	10
Second best, Mrs. Rachel Koontz, Indianapolis.....	5
Best collection bread by one exhibitor, Mrs. Benjamin Shanks, Indianapolis.....	10
Second best, Mrs. Rachel Koontz, Indianapolis.....	5
Best sugar-cured ham, J. A. Knetzer, Fillmore, Ind.....	5
Best sample catsup, Mrs. J. A. Knetzer, Fillmore, Ind.....	2
Best 10 pounds sorgho or imphe sugar, A. L. Folge, Summer, Ind .....	10
Best sorgho or imphe molasses, J. W. Ash, Morristown, Ind.....	5
Best barrel white wheat flour, Johnson & McGannon, Thorn- town, Ind.....	Diploma and 5
Best barrel red wheat flour, John Marvel, Royalton, In- diana.....	Diploma and 5
Best sack corn meal, John Marvel, Royalton, Ind.....	3
Best loaf corn pone, Mrs. Patsey McCormick, (aged 72 years,) Indianapolis .....	2

MODE OF MAKING THE PREMIUM CHEESE.

We take the night and morning's milk, mix, and heat it to eighty-five degrees. At this temperature the rennet is put in. When the milk thickens, which will be from thirty to forty-five minutes, the thickened milk is cut into small squares, carefully and gently pressed downward with the hand. The whey rises to the top and is dipped off. Next the whey is brought to a scalding heat and mixed with the curd until the temperature of the mixture is raised to ninety-eight degrees. At this temperature the whey is immediately removed. The curd is then cut in slices, which are turned up in such a manner as will allow the whey to drip or drain off as dry as possible, after which it is broken up into small bits, salted, and minced fine. The curd is now ready for the press. The hoop is lined with a cloth, and the curd placed therein, and covered with a cloth, the lid or follower is put on, and the cheese is put to press. Here it remains about four hours. It is then turned out of the hoop and the cloth removed. The cheese is then returned to the hoop, with a cloth above and below it; the pressure is again put on for twenty-four hours, more or less, according to the size of the cheese. It is

now ready for the curing room. Here it is rubbed with fresh unsalted butter, after which it is daily turned and rubbed with the hand until it is cured.

MRS. Q. THOMSON,  
Indianapolis, Indiana.

## MISCELLANEOUS DEPARTMENT.

### JELLIES, PICKLES, PRESERVES, AND CANNED FRUITS.

#### *Forty-One Entries.*

Best collection of jellies by one exhibitor, Eunice Gilson, Greensburg, Ind.....	\$5
Second best, Mrs. P. D. Stagg, Greensburg, Ind.....	3
Best collection of preserves, Mrs. J. A. Knetzer, Fillmore, Ind....	5
Second best, Miss Catharine Schröder, Plymouth, Ind.....	3
Best collection of fruit butter, Mrs. J. A. Knetzer, Fillmore, Ind.....	5
Second best, Eunice Gilson, Greensburg, Ind.....	3
Best collection of pickles by one exhibitor, Mrs. J. A. Knetzer, Fillmore, Ind.....	5
Second best, Eunice Gilson, Greensburg, Ind.....	3
Best collection of dried fruit, Mrs. James Thornburg, Wabash, Ind.....	3
Best collection of canned fruit by one exhibitor, Mrs. P. D. Stagg, Greensburg, Ind.....	10
Second best, Eunice Gilson, Greensburg, Ind.....	5
Best collection of jellies, preserves, etc., Eunice Gilson, Greensburg, Ind.....	15
Second best, William W. Merryman, Indianapolis.....	5

## HORTICULTURAL DEPARTMENT.

### APPLES AND OTHER FRUITS—AMATEURS.

#### *Ninety-nine Entries.*

Best twenty-five varieties of apples, Amos Thornburgh, Mooreville, Ind...	\$15
Best twenty varieties of apples, Amos Thornburgh, Mooreville, Ind.....	10
Best twelve varieties of apples, A. Walker, Madison, Ind.....	8
Best six varieties of apples, John Ott, Rockville, Ind.....	4
Best fifteen varieties of winter apples, W. B. Thompson, Monrovia, Ind .....	10
Best five varieties of fall apples, Taylor Bradley, Laporte, Ind....	5
Best fifteen varieties of pears, P. & C. A. Howland, Indianapolis.	15
Best ten varieties of pears, Mrs. A. Wallace & Merryman, Indianapolis.....	10
Best five varieties of winter pears, Mrs. A. Wallace & Merryman, Indianapolis .....	5
Best five varieties of peaches, D. F. Willey, Charleston, Ind.....	5
Best three varieties of peaches, J. F. Looney, Rushville, Ind.....	3
Best one variety of peaches, D. F. Willey, Charleston, Ind .....	2
Best five varieties of grapes, Taylor Bradley, Laporte, Ind.....	5
Best three varieties of grapes, Taylor Bradley, Laporte, Ind.....	3
Best five clusters of grapes of any kind, Taylor Bradley, Laporte, Ind.....	3
Best collection of grapes, Taylor Bradley, Laporte, Ind..Dip. and	10
Best show of quinces, N. Ohmer, Dayton, Ohio.....	5
Best display of fruits of all kinds, Mrs. A. Wallace & Merryman, Indianapolis.....	25

### FRUIT PROFESSIONAL LIST.

#### *Fifty-three Entries.*

Best twenty-five varieties of apples, W. A. and W. H. Ragan, Clayton.....	Diploma and \$15
Best twenty varieties apples, J. W. Ragan, Fillmore..Diploma and	10
Best twelve varieties apples, M. L. Dunlap, Champaign..Dip. and	8
Best six varieties of apples, Wm. Patrick, Terre Haute...Dip. and	4
Best fifteen varieties of winter apples, W. A. & W. H. Ragan, Clayton.....	Diploma and 10
Best five varieties fall apples, J. W. Ragan, Fillmore.....Dip. and	5
Best fifteen varieties pears, Wm. Patrick, Terre Haute...Dip. and	10

Best ten varieties autumn pears, W. Patrick, Terre Haute..Dip. and	\$10
Best four varieties winter pears, W. Patrick, Terre Haute..Dip. and	5
Best five varieties peaches, J. F. Willey, Blue Lick..Diploma and	10
Best collection of grapes, H. Mankedick, Indianapolis...Dip. and	10
Best five varieties grapes, J. W. Ragan, Fillmore....Diploma and	5
Best three varieties grapes, W. A. and W. H. Ragan, Clayton, Ind.....Diploma and	3
Best one variety grapes, M. L. Dunlap, Champaign..Diploma and	2
Best display of fruit of all kinds, W. A. and W. H. Ragan, Clay- ton .....	25

## STAR LIST OF FRUITS.

*Seventeen Entries.*

Best five varieties of winter apples, A. Walker, Anderson, Ind...	\$5
Best five varieties of fall and ten of winter apples, A. Walker, Anderson, Ind.....	15
Best five varieties of winter apples, Wm. Patrick, Terre Haute...	5
Best five varieties of fall and ten of winter apples, W. A. & W. H. Ragan, Clayton, Ind.....	15
Best display of apples from the State at large, W. A. and W. H. Ragan .....	20
Best display of pears from the State at large, W. A. and W. H. Ragan .....	15
Best display of grapes from the State at large, W. A. and W. H. Ragan, Clayton, Ind.....	10

## NURSERY STOCK, WINES, ETC.

*Seventeen Entries.*

Best collection nursery stock, J. H. Simpson & Bro, Vincennes, Ind .....	\$20
Second best, F. K. Phoenix, Bloomington, Ill .....	10
Best display of wine made in Indiana, H. Mankedick, Ind'napolis	15
Best currant wine, Eunice Gilson, Greensburg, Ind.....	Diploma
Best strawberry wine, H. Mankedick, Indianapolis.....	Diploma
Best blackberry wine, Eunice Gilson, Greensburg, Ind.....	Diploma

## GREENHOUSE PLANTS—AMATEUR.

*Twenty-Six Entries.*

Best collection greenhouse plants, not including plants for bed- ding out, Mrs. A. Wallace, Indianapolis.....	\$15
Second best, Mrs. George W. Butcher, Indianapolis.....	10
Best collection dahlias, Amy Ragan, Fillmore, Ind.....	5
Second best, Mrs. A. Wallace, Indianapolis.....	2
Best collection bedding out plants in bloom, Mrs. George W. Butcher, Indianapolis.....	8



Second best, Mrs. A. Wallace, Indianapolis.....	\$4
Best basket cut flowers, Miss Laura Dowling, Indianapolis.....	3
Second best, Mrs. George W. Butcher, Indianapolis.....	2
Best round bouquet, William Terrel, Terre Haute, Ind.....	3
Second best, Mrs. Howland, Indianapolis.....	2
Best flat bouquet, William Terrel, Terre Haute, Ind.....	3
Second best, Mrs. J. W. Ragan, Fillmore, Ind.....	2

PROFESSIONAL.

*Thirty Entries.*

Best collection green house plants, not including plants for bedding out, Anthony Wiegand, Indianapolis.....	Diploma and \$15
Best 25 varieties of dahlias, Heint Brothers, Terre Haute, Ind.....	Diploma and 5
Best collection bedding out plants in bloom, Henry Weghorst, Indianapolis.....	Diploma and 5
Best basket fresh cut flowers, August Lange, Indianapolis.....	3
Best basket fresh cut roses, August Lange, Indianapolis.....	3
Best bouquet, round, A. Wiegand, Indianapolis.....	3
Best bouquet, flat, Heint Brothers, Terre Haute, Ind.....	3
Best bouquet, mantle, Heint Brothers, Terre Haute, Ind.....	3
Best collection camellias, Anthony Wiegand, Indianapolis.....	5
Best collection winter parlor blooming plants, Anthony Weigand, Indianapolis.....	Diploma and 5
Best collection variegated leaved plants, Henry Weghorst, Indianapolis.....	5
Best arrangement of plants for exhibition, Anthony Wiegand, Indianapolis .....	15

FINE ART DEPARTMENT.

PICTURE FRAMES, ENGRAVINGS, WRITINGS, ETC.

*Fourteen Entries.*

Best collection steel engravings, H. Lieber & Co., Indianapolis...	\$3
Best collection plain and ornamental penmanship, Bryant & Stratton's College, Indianapolis.....	5
Best collection card writing, Garvin & Heinly, Terre Haute, Ind..	2

Best collection business writing, Garvin & Heinly, Terre Haute, Ind .....	\$2
Best collection off-hand writing, Bryant & Stratton's College, Indianapolis .....	2
Best collection shell work, any kind, Mrs. M. K. Igoe, Indianapolis .....	5
Best ornamental picture frames, H. Lieber & Co., Indianapolis...	3

## PAINTING, DRAWING, ETC.—AMATEUR LIST.

*Forty-Three Entries.*

Best landscape in oil, Mrs. Dagget, Indianapolis.....	\$5
Best fancy painting in oil, W. G. Castell, Indianapolis.....	5
Best portrait painting in oil, Harry Fowler, Indianapolis.....	5
Best animal painting, J. L. Winter.....	5
Best fruit painting, W. G. Castell, Indianapolis.....	5
Best crayon drawing, Harry Fowler, Indianapolis.....	5
Best pencil drawing, Mrs. Samuel Taylor, Indianapolis.....	5
Best pen drawing, C. Koerner, Indianapolis.....	5
Best letter painting, T. V. Cook, Indianapolis.....	5
Best wax flowers, Mrs. S. Barnett, Logansport, Ind.....	3
Best ornamental shell work, Mrs. S. T. Hensel, Indianapolis,.....	3
Second best, W. H. Reed, Thorntown, Ind.....	2
Best ornamental hair work, Mrs. P. D. Stagg, Greenburg, Ind....	3
Second best, Miss Angie Hilton, Sugar Creek, Ind.. .....	2
Best case stuffed birds, S. W. Vance, Indianapolis... Diploma and	5

## PAINTING, SCULPTURE, ETC.—PROFESSIONAL LIST.

*Seventy-Nine Entries.*

Best original landscape in oil, Jacob Cox, Indianapolis.....	\$20
Best fancy painting in oil, Jacob Cox, Indianapolis.....	5
Best portrait in oil, Jacob Cox, Indianapolis.....	Silver Medal
Best sign painting, T. V. Cook, Indianapolis.....	5
Best photograph portrait in oil, J. M. Dennis, Indianapolis.....	10
Best plain card photograph, L. D. Judkins, Indianapolis.....	5
Best collection plain card photographs, D. R. Clark, Indianapolis	10
Best plain photographs, 4x4 or larger, Harry Fowler, Indianapolis .....	5
Best collection photographs plain, 4x4 or larger, D. R. Clark, Indianapolis .....	10
Best group 4x4 or larger, 3 figures, John Cadwallader, Indianapolis.....	5
Best card photograph in water colors, L. D. Judkins, Indianapolis .....	5
Best 4x4 or larger photo in water colors, L. D. Judkins, Indianapolis .....	10

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Best 4x4 or larger photo in India ink, L. D. Judkins, Indianapolis .....	10
Best 11x14 photographic view, D. R. Clark, Indianapolis.....	10
Best pen drawing, Bryant & Stratton's College, Indianapolis.....	5
Best collection of pen drawings, Bryant & Stratton, Indianapolis	5
Best drawing of machinery, Bryant & Stratton, Indianapolis.....	5
Best sculpture, Lewis Whitehead, Indianapolis.....	Silver Medal
Best transfer painting, Mrs. Rachel Koontz, Indianapolis.....	3

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## DOMESTIC ARTS.

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### EMBROIDERY, BRAIDING, ETC.

#### *One Hundred and Ten Entries.*

Best specimen linen embroidery, Mrs. J. Liebhard, Knightstown,	\$3
Second best, Jeanette Abrams, Indianapolis.....	2
Best cotton embroidery, Amelia Gilmore, Bloomington.....	3
Second best, Mrs. H. K. Carr, Ligonier. ....	2
Best child's embroidered dress, Mrs. J. B. Closser, Laporte.....	2
Second best, Amelia Gilmore, Bloomington.....	1
Best Tatting, Amelia Gilmore, Bloomington.....	3
Second best, Miss Jennie May, St. Louis.....	2
Best Linen chair tidy, Amelia Gilmore, Bloomington.....	1
Best cotton chair tidy, Mrs. L. Recker, Indianapolis.....	1
Best worsted chair tidy, Mrs. Sarah Barnett, Logansport.....	2
Best silk embroidery, Father Bessonies, Indianapolis .....	2
Second best, Mrs. G. W. Jenks, Indianapolis.....	1
Best ornamental bead work, Mrs. Samuel Taylor, Indianapolis...	2
Second best, Mrs. Sarah Barnett, Logansport.....	1
Best toilet set of mats, Mrs. C. Dille, Greensburg .....	2
Second best, Miss Jennie Slack, Indianapolis.....	1
Best under garments, Mrs. Jas. Thornburg, Wabash.....	5
Second best, Miss Mary A. Jones, Greensburg.....	2
Best tucked skirt, Mrs. Jas. Thornburg, Wabash.....	2
Second best, Mary E. Brown, Indianapolis.....	1
Best cotton braiding, Mrs. J. Liebhard, Knightstown.....	2
Best linen braiding, Mrs. Emma Sayer, Wabash.....	2
Best silk braiding, Mrs. L. Recker, Indianapolis.....	2
Best worsted braiding, Amelia Gilmore, Bloomington, Ind .....	3

## TAPESTRY, WORSTED WORK, ETC.

*Forty-Eight Entries.*

Best tapestry work, Mrs. John Tarleton, Indianapolis.....	\$2
Second best, Amelia Gilmore, Bloomington.....	1
Best ottoman cover, worsted, Amelia Gilmore, Bloomington.....	2
Best embroidered chair cover, Augusta Wright, Indianapolis.....	3
Best fancy work chair cover, Augusta Wright, Indianapolis.....	2
Best sofa cushion, Amelia Abrams, Indianapolis.....	2
Best fancy worsted work, (not tapestry,) Minnie Hanf, Indianapolis .....	3
Second best, Mrs. H. K. Carr, Ligonier.....	1
Best pair braided slippers, Mrs. Gilson, Greensburg.....	2
Best yoke and sleeve, Mrs. Leibhard, Knightstown.....	3
Second best, Mrs. J. Noble, Indianapolis.....	2
Best fancy work basket, Mrs. Gilson, Greensburg.....	2
Best Crochet shawl. Clara Damme, Indianapolis.....	3
Best crochet opera hood, Mrs. J. Leibhard, Knightstown.....	2
Second best, Mrs. S. H. Sharon, Covington, Ind.....	1
Best carriage afghan, Mrs. J. B. Heustis, Indianapolis.....	3
Second best, Mrs. John T. Macauley, Indianapolis.....	2
Best darned stocking, Mrs. M. Caylor, Indianapolis.....	2
Second best, J. R. S. Thornburg, Wabash.....	1
Best hearth rug, Mrs. W. H. Seiders, Indianapolis.....	2
Second best, Mrs. W. H. Seiders, Indianapolis.....	1

## MILLINERY, ETC.

*Forty-Five Entries.*

Best silk bonnet, Dietrichs & Walker, Indianapolis.....	\$5
Best velvet bonnet, Dietrichs & Walker, Indianapolis.....	5
Second best, Dietrichs & Walker, Indianapolis.....	3
Best straw bonnet, Dietrichs & Walker, Indianapolis.....	3
Best calico dress, Mrs. Emma Sayre, Wabash.....	3
Second best, Mrs. L. Recker, Indianapolis.....	2
Best silk dress, H. S. Buckles, Ft. Wayne.....	5
Second best, Mrs. L. Recker, Indianapolis.....	3
Second best satin dress, Mrs. L. Recker, Indianapolis.....	3
No entry worthy of first premium.	
Best woolen dress, Mrs. Emma Sayre, Wabash.....	5
Second best, Mrs. J. Leibhard, Knightstown.....	3
Best display of millinery, Dietrichs & Walker, Indianapolis.....	10
Second best, J. W. Albert & Co., Indianapolis.....	5
Best collection ladies furnishing goods, Miss M. A. Jones, Greensburg .....	Diploma
Best child's sack, Miss M. A. Jones, Greensburg.....	2
Second best Miss L. M. Thomas, Terre Haute.....	1

## PREMIUMS AWARDED.

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Best child's cape, Deitrichs & Walker, Indianapolis.....	\$1
Best child's apron, Mrs. L. Recker, Indianapolis.....	1
Best lady's cap, Dietrichs & Walker, Indianapolis.....	2
Best shirt, Miss Jos. Homburg, Wabash.....	2
Second best, Mrs. H. Whitlow, Greensburg.....	1
Best artificial flowers, Dietrichs & Walker, Indianapolis.....	3
Best group flowers, Dietrichs & Walker, Indianapolis.....	5
Best lady's hat, Dietrichs & Walker, Indianapolis.....	3
Second best, Dietrichs & Walker, Indianapolis.....	2

### QUILTS, ETC.

#### *Sixty-One Entries.*

Best worsted quilt, Mrs. N. W. Montague, Acton.....	\$6
Second best, Mrs. P. D. Stagg, Greensburg.....	3
Best patchwork quilt, Mrs. V. Miller, Indianapolis.....	6
Second best, Mrs. M. Ramsey, Indianapolis.....	3
Best white quilt, Mrs. P. D. Stagg, Greensburg.....	6
Second best, Mrs. N. W. Montague, Acton.....	3
Best silk quilt, Mrs. M. N. Allen, Indianapolis.....	6
Second best, Mrs. E. Ellison, Indianapolis.....	3
Best counterpane, Mrs. S. H. Allen, Indianapolis.....	6
Second best, Mrs. Rubush, Indianapolis.....	3
Best knit quilt, Mrs. M. M. Ray, Indianapolis.....	6
Second best, Mary K. Holtzman, Bloomington.....	3
Best bed comforter, Mrs. P. D. Stagg, Greensburg.....	6
Second best, Mrs. H. Gregg, Greenwood.....	3

### NON-ENUMERATED ARTICLES.

#### *One Hundred and Fifty-Six Entries.*

Honorable mention was made of the following articles:

#### MECHANICAL.

Pruning implements, J. M. Williams & Son, Chagrin Falls, Ohio.  
 Sausage stuffer, C. Vonnegut, Indianapolis.  
 Garden hoe, H. Clark, Beech Grove, Ind.  
 Watchman's time check, Vielle & Robellaz, New Albany, Ind.  
 Gent's travelling bag, R. L. Shilling, Indianapolis.  
 Safety nut lock, Hood & Coombs, Indianapolis.  
 Egg beater, H. P. Hood, Indianapolis.  
 School desk with folding seat, T. M. Bidgood, Greenfield, Ind.  
 Bird cage, J. Behm, Indianapolis.  
 Baby engine, B. B. Eaton, Indianapolis.  
 Steel harvester guards, with section of cutter bar, W. N. Foster, Indianapolis.  
 Primary school desk, W. N. Foster, Indianapolis.

Riding and walking corn plow combined, Walker & Piatt, Laporte, Ind.

Walking plow, Walker & Piatt, Laporte, Ind.

Machine grease and can for dispensing oil, Frank A. Boyd, Indianapolis.

Model flood fence, R. S. Wells, Shelbyville, Ind.

Mole trap, J. A. Myers, Nashville, Ind.

Zinc collar pad, G. H. Richards, Buchanan, Mich.

Road wagon, Pennoyer, Shaw & Co., Chicago, Ill.

Shingle bracket, Jacob Longyear, Indianapolis.

Wagon bed, C. W. Ray, Summitville, Ind.

Fancy turned ware, A. J. Fitch, Thompson, Ohio.

Hand boring machine, Henry Pardieck & Brown, New Bethel, Ind.

Cant hook, A. B. Reeves, Knightstown, Ind.

Hay rake and cart, L. W. Frederick, Paragon, Ind.

Draft equalizer for horse power, W. T. Mason, Washington, Iowa.

Corn knife, George Stevenson, Zionsville, Ind.

Combined bee feeder and ventilator, H. M. Cameron, Coburg, Iowa.

Bedstead fastener, Berner, English & Over, Indianapolis.

Extension table, Huber & Story, Franklin, Ind.

Colored glass, Frank Erdelmeyer, Indianapolis.

Trusses, Browning & Sloan, Indianapolis.

Case of chemicals, Browning & Sloan, Indianapolis.

Programme clock, A. H. Andrews & Co., Indianapolis.

Ladies' basket, children's chairs, rocking horse, boy's express wagon, clothes hamper, American flag, Japanese kites, deer heads, Chinese lanterns, ladies' workstand, baby swing and table mats, C. Mayer & Co., Indianapolis.

Bell cord, W. A. Ford, Greensburg, Ind.

Window shade, E. S. Peters, Whitestown, Ind.

Quilting machine, Mrs. A. Hoover, Zionsville, Ind.

Sulky hay rake, A. J. Axtel, Bloomington, Ind.

#### AGRICULTURAL.

Jerusalem cherry, Mrs. C. F. Resener, Indianapolis.

Pomegranate tree, Harry Morgan, Indianapolis.

Case of confectionary, Daggett & Co., Indianapolis.

Winter oats, Arch Collins, Portland Mills, Ind.

Starch, S. Cutsinger & Co., Edinburg, Ind. (The committee advise the award of a silver medal.)

California plums, John V. Carter, Indianapolis.

#### MISCELLANEOUS.

Specimen of penmanship, Alice Lockridge, (13 years of age,) Terre Haute, Ind.

Knit corset, Mrs. E. Hartwell, Indianapolis.

**Knit drawers, Susan H. Sharon, Covington, Ind.**  
**Pin cushion, Mrs. J. C. Adams.**  
**Crochet quilt, Mrs. L. Recker, Indianapolis.**  
**Cradle quilt, Mrs. N. W. Fitzgerald, Indianapolis.**  
**Worsted embroidery, Mrs. Emma Sayre, Wabash, Ind.**  
**Black luster dress, Miss Emma Sayre, Wabash, Ind.**

**Diplomas were awarded the exhibitors of the following articles:**

**AGRICULTURAL.**

**Best Ives seeding grape, John Sacksteder, Louisville, Ky.**

**MECHANICAL.**

**Pruning implements, J. M. Williams & Son, Chagrin Falls, Ohio.**  
**Breech loading double barrelled shot gun, Whitney Arms Company, New Haven, Connecticut.**  
**Power meat chopper and hand meat chopper, C. Vonnegut, Indianapolis.**  
**Imperial patent cutter for reapers and mowers, Bowles, Oxem & Co., Williamsport, Ind.**  
**Starett vegetable and meat choppers, C. Vonnegut, Indianapolis.**  
**Collection of firearms, S. Beck & Son, Indianapolis.**  
**Duplex, French and rustic window shades, Brady & Blunck, Davenport, Iowa.**  
**Nutlock washer, K. H. Loomis, Cleveland, Ohio.**  
**School apparatus, A. H. Andrews & Co., Indianapolis.**  
**Best and greatest variety of varnishes, Mears & Lilly, Indianapolis.**  
**School desk with folding top and seat, T. M. Bidgood, Greenfield, Ind.**  
**Grinding machine for harvester knives, Connell & Sturgeon, Newark, Ohio.**  
**Needle threading thimble, C. R. Ford, Havana, Ills.**  
**Dental instruments, Robertson & Eaton, Indianapolis.**  
**Normal school desk, W. N. Foster, Indianapolis.**  
**French china, J. Woodbridge & Co., Indianapolis.**  
**Collection of pumps, R. R. Rouse, Indianapolis.**  
**Stationary and blank books, Braden & Burford, Indianapolis.**  
**Mixed paints ready for use, Frank A. Boyd, Indianapolis.**  
**Grate bars, Greenleaf Manufacturing Company, Indianapolis.**  
**Clay tempering machine, Seibert & Son, Indianapolis.**  
**Carved wood baskets, Casper Fuchs, Indianapolis.**  
**Books and stationary, Bowen Stewart & Co., Indianapolis.**  
**Fancy turned fence, Louis Kolb, Indianapolis.**  
**Quilting frame, William H. Heffley, Rochester, Ind.**  
**Hay and grain hoister, J. W. Anglin, Leesburg, Ind.**  
**Gents' furnishing goods, Eddy & West, Indianapolis.**

- Skeleton wagon, Pennoyer, Shaw & Co., Chicago.  
Case of watches, National Watch Company, Elgin, Ills.  
Combined buggy pole and shaft, G. Steiner, Deedsville, Ind.  
Egg carrier and three-horse whiffle trees, S. H. Smith, N. Adams, Michigan.  
Stone and stump extractor, Josiah Knoops, Casstown, Ohio.  
Graduating scale of patterns for cutting boot legs, J. F. Daniels, Greencastle, Ind.  
Stock cutter, Princeton (Illinois) Manufacturing Company.  
Honey extractor, A. J. Hoover, Thorntown, Ind.  
Rubber nipples, G. Stevenson, Zionsville, Ind.  
Runners for vehicles, A. Gregg, Anderson, Ind.  
Display of workmanship on plows, Lafayette (Indiana) Plow Works Company.  
Portable corn sheller, L. W. Hoyl, Worcester, Mass.  
Display of workmanship on plows, S. Horney & Co., Richmond.  
Road plow, S. Horney & Co., Richmond.  
Rotary harrow, H. J. Prier, Indianapolis.  
Show cases, books and stationery, Carmichael, Indianapolis.  
Collection of lamps, etc., Refining and Manufacturing Company, Indianapolis.  
Library Table, A. H. Andrews & Co., Indianapolis.  
Broom corn planter, Hoosier Drill Company, Milton, Ind.  
Bible and reading stand, John Blodau, Indianapolis.  
Sewing machine tucker, F. W. Brown, Cincinnati, Ohio.  
Beef-steak mangler, I. J. Merrill, Mulberry, Ohio.  
Buggy wheels and hubs, J. J. Hines, North Liberty, Ind.  
Turn-over seat carriage, Shaw, Lippincott & Co., Indianapolis.  
Flavoring extracts, E. L. Aughinbaugh & Co., Indianapolis.  
Wheel for buggy, Shirkman's Wheel Company, Peru, Ind.  
Improved mode of teaching telegraphy. Bryant & Stratton, Indianapolis.  
Stave equalizer, and tire bender and shrinker, Chandler & Taylor, Indianapolis.  
Steam pump, Dean Bros, Indianapolis.  
Eureka butter worker, J. P. Corbin, Whitney's Point, N. Y.

#### MISCELLANEOUS.

- Lace needle work, Mrs. Adams, Coventry, England.  
Paper boxes, B. A. Steinhauser, Indianapolis.  
Arrangements for teaching telegraphy, D. W. Haydock, Indianapolis.  
Case sewing machine, Weed Sewing Machine Company, Indianapolis.



Medals have been recommended to the exhibitors of the following articles:

Malleable iron castings, Richmond (Indiana) Malleable Iron Works.  
 Lady's traveling bag, R. S. Shilling, Indianapolis.  
 Fly brushes, F. J. Jones, Indianapolis.  
 Fancy turned newell posts, Louis Kolb, Indianapolis.  
 Display of hardware, Hildebrand & Fugate, Indianapolis.  
 Combined sheller and feed mill, St. Joseph Manufacturing Company, Mishawaka, Ind.  
 Straw stacker, Shelby Fulton, Smith's Valley, Ind.  
 Garden Plow, G. W. Rue, Hamilton, Ohio.  
 Combination padlock, J. A. Foster & Co., Adrain, Mich.  
 Saw gummer and sharpener, Doherty & Irwin, Crawfordsville, Ind.  
 Family carriage, Shaw, Lippincott & Co., Indianapolis.  
 Plate glass mirror, H. O. Cannon, New Albany, Ind.  
 Book case and sewing machine combined, Wheeler & Wilson's Sewing Machine Company, Indianapolis.

Money premiums were recommended to the exhibitors of the following articles:

Specimens of wood turning, Louis Kolb, Indianapolis.....	\$5
Display of workmanship on plows, Lafayette (Indiana) Plow Works.....	1
Single coverlet, Mrs. C. Nelson, Indianapolis.....	1
Pair home made blankets, Mrs. C. Nelson, Indianapolis.....	2
Zephyr worsted flowers, Frances Adams, Indianapolis.....	1
Lady's braided wrapper, Miss Libbie Rawls, Indianapolis.....	3
Humming bird's nest, Mrs. P. E. Davidson, Indianapolis.....	1
Mat, Mrs. B. A. Shartle, Terre Haute, Ind.....	1
Children's bibs, Mrs. G. W. Jenks, Indianapolis.....	50c
Ornamental pea fowl, Mrs. H. K. Carr, Ligonier, Ind.....	\$1
Collection crochet work, Mrs. L. Recker, Indianapolis.....	1
Cradle quilt, Mrs. P. D. Stagg, Greensburg, Ind.....	1
Gent's hair guard, Mrs. P. D. Stagg.....	1
Hair necklace, Mrs. P. D. Stagg, Greensburg, Ind.....	3
Sofa tidy, Mrs. N. W. Fitzgerald, Indianapolis.....	1
Embroidered gown, Miss M. A. Jones, Indianapolis.....	2
Silk lace, Mary A. Jones, Indianapolis.....	1
Two pair fancy embroidered pillow slips, Miss Mary A. Jones, Indianapolis.....	1
Silk embroidered pin cushion, Miss Mary A. Jones, Indianapolis,	1
Penmanship, Susie Pitts, Vevay, Ind.....	1
Husk basket, Miss Mary Vincent, Indianapolis.....	50c
Pillow slip, Mrs. Hester Faris, Indianapolis.....	1

After recommending the above premiums on Non-Enumerated articles, the committee say:

"In concluding their labors, your committee would respectfully

but earnestly urge the necessity for so arranging the non-enumerated articles in future, that they may occupy a separate hall or part of a hall, that they may be examined without the great labor now necessary to find them, scattered, as they are, over the whole fair ground.

R. T. BROWN,

E. T. COX,

Committee.

#### SPECIAL PREMIUMS.

For boar and three sows of any age, E. R. Moody & Co., Eminence, Kentucky, \$20. Offered by S. F. Penticost.

Best boar, one year old and under two, first, S. F. Penticost, Zionsville, Indiana, \$50. Second, Spahr & McCoy, Centerville, Indiana, \$30. Third, Drook & Ward, Liberty, Indiana, \$20. Offered by Kingan & Co., and Ferguson.

Sow, two years old and under three, with five pigs, R. Baldrige, Hagerstown, Indiana, first, \$50. Samuel D. Shield, Paddy's Run, Ohio, second and third, \$30 and \$20. Offered by Kingan & Co., and Ferguson.

Boar, one year old and over, R. G. Hayworth, Liberty, Indiana, \$25. Offered by Coffin & Co.

Sow one year old and over, Samuel D. Shield, Paddy's Run, Ohio, \$25. Offered by Coffin & Co.

Horse trained by boy 15 to 18 years of age, A. C. Shropshire, Paris, Kentucky, first, \$50; C. M. Cooper, Indianapolis, second, \$30; O. S. McLaughlin, Indianapolis, third, \$20. Offered by James B. Ryan. Protested by Cooper.

Horse any age, L. D. Foudray, Indianapolis, a white fur robe. Offered by Isaac Davis, Conner & Co.

Saddle horse, Lewis Colwell, Lewisville, Indiana, a silk hat. Offered by J. A. Seaton & Co.

Six Southdown sheep, John Middleton, Eminence, Kentucky, one pair of blankets. Offered by Geisendorff & Co.

Fat cow, W. W. Thrasher, Groves, Indiana, \$25. Offered by the Sherman House.

Fat sheep, John Middleton, Eminence, Kentucky, \$15. Offered by the Revere House.

Gelding, 3 years old and over, C. M. Cooper, Indianapolis, copy of Shakspeare. Offered by J. H. V. Smith & Co.

Pair of ducks, any kind, L. H. McKernan, Indianapolis, \$3. Offered by David Munson.

Essay on under-draining, Delos Wood, North Madison, Indiana, improved steel plow. Offered by Kingsbury. The committee recommended the publication of another essay on the same subject, written by Thomas M. Hamilton, Greensburg, Indiana.

Oldest person at State Fair, David Morris, Acton, Indiana, gold spectacles. Offered by L. W. Moses.

Child's dress, Miss Annie Williams, sewing machine attachments. Offered by Weed Sewing Machine Company.

Tucked skirt, Mrs. M. M. Day, sewing machine attachments. Offered by Florence Sewing Machine Company.

Patch quilt, Mrs. Emily E. Dayer, Indianapolis, \$5. Offered by Pettis, Dickson & Co.

Forest leaves in wreath, Miss Kate White, Indianapolis, \$10. Offered by Braden & Burford.

Musical band, Charles A. Jones, Fort Wayne, E flat cornet, valued at \$60. Offered by Benham Bros.

Baby carriage affghan, Miss M. Kerlin, Indianapolis, gold pen. Offered by J. H. V. Smith.

Half bushel of white corn, S. E. Jack, Cicero, Indiana, one box of starch, \$5. Offered by Blue River Starch Company.

Bushel of wheat, of any kind, John Marvel, Royalton, Indiana, sod plow. Offered by J. G. Stilz.

Collection of vegetables, George W. Butcher, Indianapolis, first premium, \$10; John Marvel, Royalton, Indiana, H. C. cultivator. Offered by J. Geo. Stilz.

One hundred or more pounds cutting leaf tobacco, Anthony Robinson, Indianapolis, \$20. Offered by Thomas Madden & Co.

One-half bushel Peerless or Early Rose potatoes, John Marvel, Royalton, Ind., one horse corn dropper. Offered by Vinnedge, Beeler & Co.

Ten pounds butter, Mrs. Mary Marvel, Royalton, Ind., family bible. Offered by J. H. V. Smith.

Batch of butter, Mrs. Benjamin Shanks, Indianapolis, \$10 dollars. Offered by Indianapolis Sentsfnel.

Wheat bread, made by lady of eighteen, Miss Alice Shanks, Indianapolis, guitar. Offered by M. A. Stowell.

Five pounds butter, made in September, Mrs. Harriet Gregg, Greenwood, Ind., \$5. Offered by the Capital House.

Butter, Mrs. E. Brown, Indianapolis, Russia stove. Offered by Johnson Brothers.

Five pounds honey, W. A. Horton, Rochester, Ind., five pounds tea. Offered by Ripley & Gates.

White sponge cake, Mrs. Fred. Risener, Indianapolis, parlor stove. Offered by R. L. McOuat.

Bush. joint pop corn, C. F. McClelland, Bridgeport, Ind., No. 1 Hamilton plow, valued at \$16. Offered by Houck, Spencer & Co.

Display of agricultural implements, Long & Alstatter, Hamilton, Ohio, \$100. Offered by the Spencer House.

Saw-mill, ten-horse power, result of ten hours' work, Osborn Beard, Economy, Indiana, 1st premium, \$50; J. Hurley, Chesterfield, Ind., 2d premium, \$25. Offered by Chandler & Taylor.

Five varieties winter apples most profitable for commercial purposes

in Northern, Ind., A. Walker, Anderson, Ind., \$5. Offered by Jno. C. Shoemaker. The National Road to be the dividing line.

Five fall and ten winter Northern Indiana apples, A. Walker, Anderson, Ind., \$20. Offered by John C. Shoemaker.\*

Five varieties of Southern Indiana winter apples, W. Patrick, Terre Haute, Ind, \$5. Offered by John C. Shoemaker.

Five fall and ten winter varieties of Southern Indiana apples, W. Patrick, Terre Haute, \$20. Offered by John C. Shoemaker.

Collection of cut flowers, Mrs. Geo. W. Butcher, Indianapolis, \$20. Offered by James Vick, Rochester, New York.

Collection Phlox Drummondii, Mrs. George W. Butcher, Indianapolis, \$10. Offered by James Vick.

Collection asters, Mrs. George W. Butcher, Indianapolis, \$10. Offered by James Vick.

Collection balsams, Mrs. George W. Butcher, Indianapolis, \$10. Offered by James Vick.

Dianthus family, Mrs. Geo. W. Butcher, Indianapolis, \$10. Offered by James Vick.

Collection pansies, Mrs. George W. Butcher, Indianapolis, \$10. Offered by James Vick.

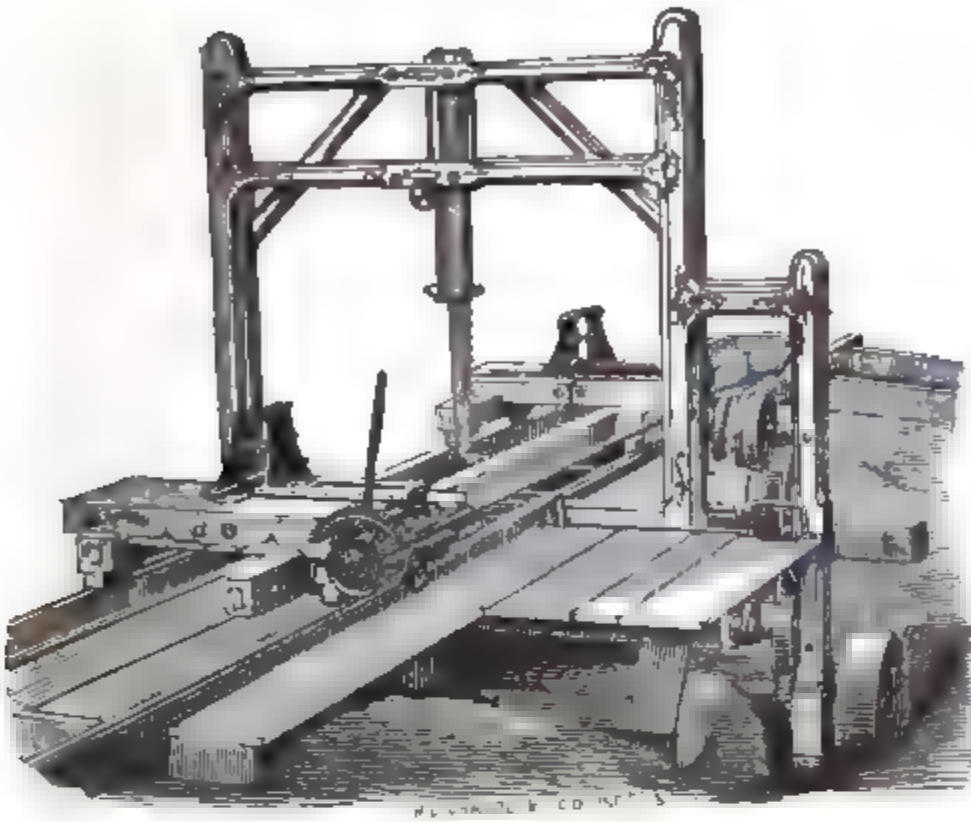
Collection stocks, Mrs. George W. Butcher, Indianapolis, \$10. Offered by James Vick.

Everlasting flowers and grasses, Mrs. George W. Butcher, Indianapolis, \$10. Offered by James Vick.

The entries following are for Vick's special premiums in flowers, grown by persons under twenty years of age:

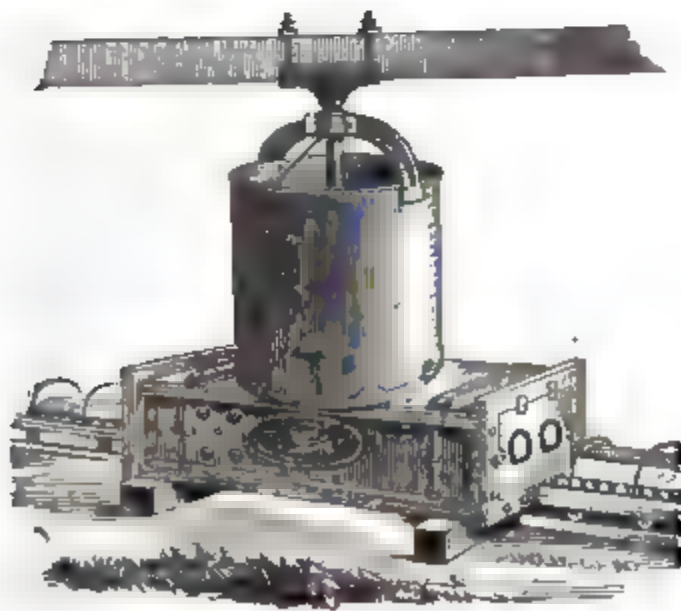
Phlox Drummondii, Mary M. Butcher, Indianapolis .....	\$5
Balsams, Mary M. Butcher, Indianapolis.....	5
Dianthus family, Mary M. Butcher, Indianapolis.....	5
Pansies, Mary M. Butcher, Indianapolis.....	5

**MULAY SAW MILL,**



**Manufactured by Chandler & Taylor.**

**PHOENIX TILE MACHINE,**



**Manufactured by Chandler & Taylor, Indianapolis, Ind.**



# INDIANA STATISTICS.

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The following tables of the Statistics of Agriculture of Indiana have been selected and compiled from the advance sheets of the Ninth Census Report, for 1870.

The subjoined extracts from the pamphlet of "Instructions to Assistant Marshals," and the remarks selected from the preface will serve in explanation of the tables.

Farms for the purposes of the Agricultural Schedule include all considerable nurseries, orchards and market-gardens owned by separate parties, cultivated for profit, and employ at least one able-bodied man during the year, and excludes family vegetable gardens, cabbage and potato patches, and ornamental lawns, and farms of less than three acres, unless \$500 worth of produce has been sold off it during the year.

"Improved land" is cleared land used for grazing, grass, tillage or lying fallow.

In giving areas of farms, improved and unimproved; irreclaimable marshes and considerable bodies of water, are excluded.

Sucking pigs, spring lambs and calves are omitted in giving the number of live stock.

The "Produce of the Year" includes the total of all crops, whether sold or consumed on the farm.

"Clover and Grass Seed" includes only that which is cleaned for use or for market.

Home Manufactures includes all articles made on the

farm, whether for sale or home use. Articles *purchased* for use in such manufactures are to be deducted.

Total value of "Annual Production" does not include speculative rise in land nor increase in value by opening of railroads, but is intended to exhibit the actual increase produced by farm labor.

### THE CENSUS AGRICULTURAL YEAR

Although made by law to end June 1st, actually drags along in some counties until December, and even later, and thereby the production returned is made up, without any determinable proportion, from the production of part of another year, while it was contemplated that the crop of 1870 alone should make up the agricultural schedule.

The large relative falling off in the live stock of the State, between 1860 and 1870, is due in great part, if not entirely, to the tremendous waste of four years of war.

There is undoubtedly a considerable underestimate of "Animals slaughtered and sold for slaughter," owing to the fact that large numbers of cattle are sold from farms to traders, which are subsequently converted into beef, from time to time, as the demand may justify, which, at the time of sale from the farm, could not be considered as sold for slaughter.



*Comparison of the Productions of Agriculture in Indiana,  
for the years 1870, 1860 and 1850, compiled from the  
Ninth United States Census for 1870.*

	1870.	1860.	1850.
Acres of land in farms, improved .....	10,104,279	8,242,183	5,046,543
Acres of land in farms, woodland.....	7,189,334	.....	.....
Acres of land in farms, other unimproved....	82,635	8,146,109	7,746,879
Present cash value of farms.....	634,804,189	353,712,175	136,385,173
Present cash value of farm implements .....	17,076,591	10,457,897	6,704,444
Total amount of wages paid during the year, including value of board.....	9,675,348	.....	.....
Total (estimated) value of all farm products, including betterments and additions to stock .....	122,914,302	.....	.....
Orchard products.....	2,858,086	1,258,042	324,940
Produce of market gardens .....	487,479	546,153	72,864
Forest products.....	2,645,679	.....	.....
Value of home manufactures.....	605,639	986,393	1,631,039
Value of animals slaughtered, or sold for slaughter.....	30,246,962	9,824,204	6,567,935
Value of all live stock .....	83,776,782	41,825,539	22,478,555
Horses, number of, on farms.....	497,883	520,677	314,299
Horses not on farms .....	55,320	39,425	.....
Mules and Asses, number of.....	43,259	28,893	6,599
Milch Cows, number of, on farms.....	393,736	363,533	284,554
Working Oxen, number of, on farms.....	14,088	117,687	40,221
Other Cattle, number of, on farms.....	618,360	588,144	389,991
Cattle not on farms.....	156,804	79,340	.....
Sheep, number of.....	1,612,680	991,175	1,122,493
Swine, number of.....	1,872,230	3,099,110	2,263,776
Wheat, Spring, bushels.....	161,991	.....	.....
Wheat, Winter, bushels.....	27,585,231	16,848,267	6,214,458
Rye, bushels.....	457,468	463,495	78,793
Indian Corn, bushels .....	51,094,538	71,588,919	52,964,363
Oats, bushels .....	8,590,409	6,317,831	5,655,014
Barley, bushels.....	356,262	382,245	45,483
Buckwheat, bushels .....	80,231	396,989	149,740
Tobacco, pounds.....	9,325,392	7,993,378	1,044,620
Cotton, bales .....	3	.....	14
Wool, pounds.....	5,029,023	2,552,318	2,610,287
Wool, average of fleeces, pounds.....	3 12-100	2 57-100	.....
Peas and Beans, bushels.. ..	35,526	79,902	35,773
Potatoes, Irish, bushels.....	5,399,044	3,866,647	2,083,337
Potatoes, Sweet, bushels.....	150,705	299,516	201,711
Wine, gallons.....	19,479	102,895	14,055
Butter, pounds .....	22,915,385	18,506,651	12,881,535
Cheese, pounds .....	283,807	605,795	624,564
Milk sold, gallons.....	936,903	.....	.....
Hay, tons.....	1,076,768	622,425	403,230
Clover Seed, bushels .....	61,168	60,726	18,320
Grass Seed, bushels.....	17,377	37,914	11,951
Hops, pounds.....	63,884	27,884	92,796
Hemp, tons.....	22	4,222	.....
Flax, pounds.....	37,771	97,119	584,469
Flax Seed, bushels.....	401,931	119,420	36,888
Sugar, Maple, pounds.....	1,342,332	1,541,761	2,921,192
Molasses, Sorghum, gallons.....	2,026,212	881,049	.....
Molasses, Maple, gallons.....	227,880	292,908	180,325
Beeswax, pounds .....	12,049	34,525	} 935,329
Honey, pounds .....	396,278	1,224,489	

PRODUCTIONS OF AGRICULTURE IN THE STATE OF INDIANA.

Selected from the Ninth Census of the United States, 1870.

Number.	COUNTIES.	ACRES OF LAND.			PRESENT CASH VALUE.	
		Improved.	UNIMPROVED.		Of Farms.	Of farming imple-ments and ma-chinery.
			Woodland.	Other unim-proved.		
	Total .....	Number.	Number.	Number.	Dollars.	Dollars.
		10,104,279	7,189,334	826,035	634,804,189	17,676,591
1	Adams .....	76,020	84,400	.....	3,453,733	152,263
2	Allen .....	155,211	158,916	11,166	12,696,607	401,068
3	Bartholomew ....	131,355	82,997	840	9,748,630	255,271
4	Benton .....	133,812	4,297	23,769	4,300,560	82,637
5	Blackford.....	30,863	34,699	3,964	1,524,040	60,219
6	Boone .....	126,942	103,080	761	8,974,665	244,307
7	Brown .....	41,825	56,694	335	1,205,152	44,125
8	Carroll .....	97,359	83,296	1,363	7,420,307	236,552
9	Cass .....	88,381	73,461	2,673	7,077,945	198,595
10	Clarke .....	106,511	76,084	1,696	6,986,128	177,782
11	Clay .....	90,039	84,225	2,049	4,790,525	132,426
12	Clinton .....	149,402	119,420	1,173	10,666,922	502,745
13	Crawford.....	61,256	44,607	63,187	1,501,154	42,183
14	Davless .....	109,231	96,756	3,165	5,849,692	191,262
15	Dearborn .....	108,834	61,408	5,611	6,337,995	241,781
16	Decatur .....	136,270	72,788	21,966	8,809,318	184,231
17	De Kalb .....	109,431	95,497	9,969	8,063,488	249,906
18	Delaware .....	133,491	94,652	1,969	10,025,183	253,759
19	Dubois.....	69,155	97,090	4,789	1,964,964	99,928
20	Elkhart.....	148,671	88,651	7,504	15,060,300	250,379
21	Fayette .....	85,856	39,256	70	6,705,061	131,045
22	Floyd .....	46,042	34,839	1,228	2,697,946	77,096
23	Fountain.....	115,993	77,763	2,235	7,399,502	237,381
24	Franklin .....	139,164	99,903	2,609	8,990,998	264,812
25	Fulton .....	78,219	65,621	18,234	4,497,626	126,151
26	Gibson .....	106,169	27,085	65,291	6,261,688	195,604
27	Grant .....	123,550	86,270	24,109	8,531,699	263,179
28	Greene .....	124,962	125,882	3,785	4,701,180	147,864
29	Hamilton .....	125,984	93,369	3,345	9,840,058	245,679
30	Hancock .....	98,833	71,509	1,106	7,721,401	235,665
31	Harrison.....	141,665	136,065	157	5,044,381	195,530
32	Hendricks .....	129,838	104,841	7,481	12,195,484	180,126
33	Henry .....	147,479	85,013	6,201	12,464,507	303,462
34	Howard.....	63,222	59,858	2,305	3,889,797	105,259
35	Huntington .....	105,453	98,884	1,372	7,573,192	219,095
36	Jackson .....	131,148	119,955	2,176	6,069,099	180,830
37	Jasper .....	55,060	35,343	39,995	2,355,095	84,439
38	Jay.....	94,194	98,423	3,020	5,337,530	197,468
39	Jefferson .....	138,106	83,214	2,432	6,537,858	181,493

PRODUCTIONS OF AGRICULTURE—Continued.

Number.	COUNTIES.	ACRES OF LAND.			PRESENT CASH VALUE	
		Improved.	UNIMPROVED.		Of Farms.	Of farming imple- ments and ma- chinery.
			Woodland.	Other unim- proved.		
		Number.	Number.	Number.	Dollars.	Dollars.
40	Jennings.....	104,622	87,885	238	4,156,608	140,798
41	Johnson.....	124,161	61,809	1,922	8,847,789	202,417
42	Knox.....	117,601	81,779	38,831	6,621,484	187,912
43	Kosciusko.....	123,227	122,862	21,441	10,714,421	248,957
44	LaGrange.....	111,102	70,000	27,464	9,473,413	339,663
45	Lake.....	114,102	28,279	33,642	5,332,045	199,173
46	Laporte.....	180,080	84,105	44,858	11,368,464	321,805
47	Lawrence.....	137,026	109,850	240	4,802,948	140,478
48	Madison.....	133,190	87,521	1,173	9,849,441	242,571
49	Marion.....	138,859	84,276	1,740	11,308,442	383,673
50	Marshall.....	90,981	109,583	15,255	6,930,262	183,381
51	Marin.....	84,381	93,702	370	2,196,404	78,810
52	Miami.....	106,679	78,980	7,934	8,253,410	284,314
53	Monroe.....	102,442	102,869	3,606	4,003,043	93,120
54	Montgomery.....	104,979	126,711	9,108	14,480,217	257,263
55	Morgan.....	133,616	97,612	50	8,546,855	248,503
56	Newton.....	88,380	8,167	11,539	2,408,840	99,083
57	Noble.....	113,016	98,400	11,538	8,845,480	222,903
58	Ohio.....	34,550	17,760	3,287	2,732,000	39,506
59	Orange.....	138,355	94,891	145	1,840,405	174,462
60	Owen.....	132,763	90,903	11,423	5,810,435	126,709
61	Parks.....	167,788	87,227	2,304	9,734,307	250,331
62	Perry.....	54,829	103,889	690	3,600,140	70,664
63	Pike.....	84,404	87,545	214	2,421,810	121,999
64	Porter.....	110,801	27,403	48,955	4,813,402	119,109
65	Posey.....	110,182	75,000	6,390	6,274,709	218,641
66	Putnam.....	66,638	66,908	15,289	2,407,485	77,355
67	Putnam.....	169,869	110,428	698	12,104,422	247,014
68	Randolph.....	151,191	118,726	1,829	10,111,413	203,675
69	Ripley.....	129,320	114,005	911	6,180,440	186,356
70	Rush.....	104,777	37,710	16,865	12,339,461	371,120
71	Scott.....	54,393	40,789	1,806	1,784,670	56,883
72	Shelby.....	137,801	72,622	12,413	1,080,674	319,174
73	Spencer.....	106,462	87,749	113	3,814,800	185,442
74	Stark.....	15,148	15,882	13,178	777,472	25,368
75	Steuben.....	86,144	61,274	9,629	6,402,274	149,772
76	St. Joseph.....	123,976	80,177	24,010	10,878,848	176,783
77	Sullivan.....	120,724	102,896	1,265	6,633,817	141,709
78	Switzerland.....	86,807	39,107	1,208	5,106,800	174,653
79	Tippecanoe.....	190,567	61,290	9,132	12,563,074	282,408
80	Tipton.....	46,947	62,610	1,465	3,048,000	83,115
81	Union.....	68,733	31,007	491	6,030,470	235,167
82	Vanderburgh.....	66,913	41,424	118	4,241,776	134,724
83	Vermillion.....	67,648	62,065	618	4,148,025	96,358
84	Vigo.....	127,604	80,459	7,008	8,700,563	218,509
85	Wabash.....	121,578	97,013	680	8,727,065	322,581
86	Warren.....	131,445	35,369	8,857	5,800,901	112,491
87	Warrick.....	103,241	89,743	4,164	4,400,736	204,206
88	Washington.....	168,678	133,627	140	6,209,183	193,051
89	Wayne.....	189,674	82,326	2,170	14,504,496	278,905
90	Wells.....	86,794	99,783	330	6,113,709	170,819
91	White.....	109,741	23,041	28,844	4,666,106	128,708
92	Whitley.....	83,948	92,470	2,165	6,473,308	187,275

## PRODUCTIONS OF AGRICULTURE—Continued.

Number.	COUNTIES.	Total amount of wages paid during the year, including value of board.	Total estimated value of all farm productions, including betterments and additions to stock.	Orchard products.	Produce of market gardens.	Forest products.
		Dollars.	Dollars.	Dollars.	Dollars.	Dollars.
	Total .....	2,675,348	123,914,902	2,858,086	467,479	2,645,679
1	Adams.....	39,394	922,343	7,447		15,532
2	Allen.....	136,863	1,876,523	77,420	28,771	102,474
3	Bartholomew.....	296,692	2,038,730	44,991	3,380	24,621
4	Benton.....	52,894	1,228,080	4,464	15	533
5	Blackford.....	23,120	342,116	8,408	459	17,128
6	Boone.....	79,167	3,814,552	39,320	6,570	80,406
7	Brown.....	26,945	559,069	9,965	232	6,599
8	Carroll.....	89,823	1,317,588	26,160	3,320	34,927
9	Cass.....	141,816	1,328,609	34,418	8,323	57,272
10	Clarke.....	120,826	1,101,173	32,941	14,084	35,129
11	Clay.....	56,450	839,811	19,640	225	27,770
12	Clinton.....	143,932	2,832,808	52,060	69	48,007
13	Crawford.....	16,236	472,697	28,741	216	10,644
14	Daviess.....	57,891	1,427,251	38,753	19,184	9,500
15	Dearborn.....	94,686	1,260,392	34,099	3,635	10,582
16	Decatur.....	160,336	1,650,579	26,630	75	10,366
17	De Kalb.....	99,175	1,380,809	45,890	400	45,142
18	Delaware.....	125,197	1,746,273	62,462	1,139	18,970
19	Dubois.....	18,147	855,952	12,241	12	116
20	Elkhart.....	130,190	1,577,840	48,717	6,430	53,171
21	Fayette.....	72,694	1,806,672	13,490	2,203	4,360
22	Floyd.....	52,653	478,138	26,407	27,252	19,247
23	Fountain.....	160,742	1,424,378	25,189	6,381	20,347
24	Franklin.....	142,612	1,830,814	37,269	256	59,389
25	Fulton.....	72,799	865,167	20,636		21,983
26	Gibson.....	102,490	1,601,822	30,648	13,974	3,658
27	Grant.....	94,855	1,595,862	52,917	1,225	46,300
28	Greene.....	48,233	1,369,818	36,819	50	6,487
29	Hamilton.....	99,444	1,746,085	52,678	1,522	38,095
30	Hancock.....	86,788	1,482,245	26,021	500	32,429
31	Harrison.....	120,396	1,147,821	43,244	5,891	8,116
32	Hendricks.....	102,097	1,722,832	31,690	426	44,513
33	Henry.....	212,166	2,868,670	41,731	1,094	52,118
34	Howard.....	26,461	861,829	19,053	2,100	33,016
35	Huntington.....	55,177	1,263,204	30,847	2,626	68,161
36	Jackson.....	142,361	1,885,856	26,270	1,421	45,612
37	Jasper.....	25,245	556,409	4,118		
38	Jay.....	36,408	1,013,961	24,418	33	11,691
39	Jefferson.....	179,727	1,404,476	30,404	35,764	10,140
40	Jennings.....	58,779	1,131,264	21,182	982	39,392
41	Johnson.....	146,185	2,890,818	41,623	2,326	17,898
42	Knox.....	175,859	1,589,760	54,830	8,538	37,375
43	Kosciusko.....	122,692	1,480,170	45,089	536	65,304
44	LaGrange.....	102,642	1,287,567	39,444	5	20,476
45	Lake.....	82,948	968,925	25,073	1,560	36,973
46	Laporte.....	229,585	1,843,529	36,824	8,396	61,025
47	Lawrence.....	92,458	844,365	27,231	11,606	3,436
48	Madison.....	145,149	2,219,592	76,962	1,662	31,159
49	Marion.....	391,948	2,811,844	59,177	71,007	102,556
50	Marshall.....	66,011	964,347	21,045	1,912	55,879
51	Martin.....	43,296	617,928	24,464	295	11,762
52	Miami.....	145,792	1,539,845	39,804	12,180	64,943
53	Monroe.....	54,099	892,560	37,806	386	27,759

PRODUCTIONS OF AGRICULTURE—Continued.

Number.	COUNTIES.	Total amount of wages paid during the year, including value of board.	Total estimated value of all farm productions, including betterments and additions to stock.	Orchard products.	Produce of market gardens.	Forest products.
		Dollars.	Dollars.	Dollars.	Dollars.	Dollars.
54	Montgomery .....	197,501	2,370,176	52,639	1,805	47,039
55	Morgan .....	156,808	1,699,704	47,635	5,984	32,841
56	Newton .....	54,288	481,320	4,222	1,772	3,241
57	Noble .....	128,760	1,526,561	41,672	535	60,708
58	Ohio .....	29,284	439,790	2,885	2,500	1,975
59	Orange .....	38,549	798,463	38,025	9,907	6,470
60	Owen .....	57,869	1,024,703	30,985	220	17,168
61	Parke .....	147,142	1,973,990	32,113	1,704	12,374
62	Perry .....	23,965	561,188	25,356	4,675	29,250
63	Pike .....	70,426	937,068	11,146	194	200
64	Porter .....	88,155	820,630	10,587	4,980	47,211
65	Posey .....	162,462	1,688,097	26,564	85	7,505
66	Pulaski .....	23,860	885,293	10,375	90	25
67	Putnam .....	94,403	1,612,814	36,583	3,763	20,105
68	Randolph .....	83,365	1,734,541	37,808	50	53,928
69	Ripley .....	71,559	1,188,305	28,262	130	38,785
70	Rush .....	312,774	2,244,472	46,156	610	35,605
71	Scott .....	15,550	457,578	15,814	7,699	20,229
72	Shelby .....	191,535	2,281,933	31,007	2,816	10,102
73	Spencer .....	73,649	1,053,676	22,984	3,545	5,149
74	Starke .....	12,622	218,548	6,719	165	27,898
75	Steuken .....	72,260	1,245,946	44,270	241	10,087
76	St. Joseph .....	176,015	1,467,265	49,721	13,472	93,364
77	Sullivan .....	49,614	1,260,945	27,711	170	9,381
78	Switzerland .....	92,941	828,176	11,016	16,252	2,493
79	Tippecanoe .....	325,958	2,176,885	34,819	17,896	55,352
80	Tipton .....	50,523	701,112	17,555	465	36,193
81	Union .....	130,556	1,391,285	20,603	2,848	14,131
82	Vanderburgh .....	84,444	913,340	16,587	20,230	1,350
83	Vermillion .....	82,935	892,741	13,819	120	8,756
84	Vigo .....	212,768	1,695,229	24,312	31,323	32,076
85	Wabash .....	102,677	1,550,156	37,868	1,877	26,414
86	Warren .....	120,298	1,583,014	12,214	.....	3,848
87	Warrick .....	89,138	1,236,835	34,996	700	4,858
88	Washington .....	52,481	1,308,059	50,265	142	8,169
89	Wayne .....	197,936	1,833,842	31,594	6,178	63,162
90	Wells .....	57,365	1,124,641	21,257	120	41,090
91	White .....	71,750	850,417	18,282	594	7,087
92	Whitley .....	82,597	1,072,044	30,935	220	51,078

## PRODUCTIONS OF AGRICULTURE—Continued.

Number.	COUNTIES.	Value of home manufactures.	Value of animals slaughtered or sold for slaughter.	LIVE STOCK.		
				Value of all live stock.	Horses.	Mules and asses.
	Total.....	Dollars. 605,639	Dollars. 30,246,962	Dollars. 83,776,782	Number. 497,883	Number. 43,259
1	Adams.....	8,133	127,135	521,997	4,667	29
2	Allen.....	12,127	380,311	1,282,233	8,740	94
3	Bartholomew.....	3,689	590,210	1,040,804	6,189	1,043
4	Benton.....	332	596,883	781,020	3,115	314
5	Blackford.....	4,244	68,270	284,844	2,646	77
6	Boone .....	10,412	402,324	1,300,597	7,902	637
7	Brown .....	2,131	57,160	253,611	2,062	191
8	Carroll .....	2,805	230,776	816,058	5,175	164
9	Cass .....	1,162	207,962	749,476	4,989	129
10	Clarke .....	4,709	281,573	804,357	4,475	570
11	Clay .....	7,699	177,852	646,962	4,927	453
12	Clinton.....	9,031	508,817	1,115,284	7,703	241
13	Crawford .....	17,373	75,859	639,248	2,778	271
14	Daviess .....	12,315	356,162	953,662	5,989	760
15	Dearborn .....	1,626	235,551	798,875	4,507	469
16	Decatur .....	3,174	605,527	1,368,785	6,259	1,338
17	DeKalb.....	2,389	224,477	920,078	5,839	79
18	Delaware.....	8,281	439,445	1,187,038	6,849	387
19	Dubois.....	5,707	206,907	457,174	3,428	227
20	Elkhart.....	3,193	254,228	1,088,212	7,204	207
21	Fayette. ....	1,281	483,317	749,882	3,601	283
22	Floyd.....	1,668	56,401	252,804	1,780	103
23	Fountain .....	21,520	331,308	1,099,281	6,578	825
24	Franklin.....	2,804	465,200	1,083,342	6,049	441
25	Fulton.....	6,804	144,427	627,353	4,700	112
26	Gibson .....	10,842	381,502	842,355	5,206	965
27	Grant.....	7,782	359,471	1,130,760	6,942	250
28	Greene.....	8,352	38,350	898,558	6,464	475
29	Hamilton.....	898	479,980	1,347,230	7,047	373
30	Hancock .....	2,868	338,194	877,629	5,246	204
31	Harrison .....	15,803	223,115	787,341	6,155	408
32	Hendricks .....	8,525	654,466	1,645,701	7,550	1,176
33	Henry .....	11,669	786,060	1,439,242	6,894	249
34	Howard.....	1,888	140,515	491,664	3,803	203
35	Huntington.....	8,854	219,508	832,861	5,902	131
36	Jackson.....	5,237	412,833	888,960	5,842	944
37	Jasper .....	56	266,025	715,390	3,119	137
38	Jay.....	14,632	168,027	815,640	6,046	198
39	Jefferson.....	10,877	246,923	1,096,634	6,406	726
40	Jennings.....	4,697	272,129	683,596	4,837	639
41	Johnson.....	6,365	742,406	1,312,462	6,319	787
42	Knox .....	5,416	331,587	971,152	6,415	814
43	Kosciusko .....	5,514	315,984	1,114,108	7,964	149
44	LaGrange .....	3,529	177,860	855,631	5,217	82
45	Lake.....	2,141	171,538	1,023,241	6,560	121
46	LaPorte .....	2,200	256,312	1,082,302	7,297	390
47	Lawrence .....	7,465	353,073	960,229	5,266	1,516
48	Madison .....	15,186	576,515	1,229,996	7,677	225
49	Marion.....	4,199	618,608	1,488,105	7,483	1,064
50	Marshall.....	1,532	181,647	748,845	5,166	292
51	Martin .....	16,163	139,432	387,564	3,257	375
52	Miami .....	4,973	344,173	1,034,784	6,509	360
53	Monroe .....	10,688	273,279	762,954	4,612	814

PRODUCTIONS OF AGRICULTURE—Continued.

Number.	COUNTIES.	Value of home manufactures.	Value of animals slaughtered or sold for slaughter.	LIVE STOCK.		
				Value of all live stock.	Horses.	Mules and asses.
		Dollars.	Dollars.	Dollars.	Number.	Number.
54	Montgomery. ....	11,515	708,157	1,965,390	9,466	1,222
55	Morgan .....	17,240	642,855	1,240,651	6,142	542
56	Newton .....	190	184,583	580,881	2,814	258
57	Noble .....	1,696	250,373	940,774	6,067	163
58	Ohio .....	1,350	49,103	228,105	1,234	223
59	Orange.....	19,400	353,854	811,996	4,798	596
60	Owen .....	3,249	238,123	934,191	5,815	583
61	Parke.....	4,659	517,379	1,570,744	7,384	801
62	Perry .....	12,900	89,007	329,524	2,770	183
63	Pike .....	19,839	220,481	628,399	4,311	498
64	Porter. ....	1,866	182,689	813,150	5,087	184
65	Posey .....	3,914	318,756	814,196	5,383	1,052
66	Pulaski.....	758	55,705	510,396	2,576	131
67	Putnam ...	2,553	862,463	2,182,097	8,274	2,416
68	Randolph .....	8,399	399,920	1,242,842	8,485	289
69	Ripley .....	27,377	244,068	868,063	6,439	609
70	Rush. ....	9,832	1,075,035	1,690,645	7,799	770
71	Scott.....	10,128	83,546	387,705	2,342	390
72	Shelby .....	4,190	451,841	1,347,025	7,739	510
73	Spencer .....	6,281	189,420	691,282	4,892	683
74	Starke .....	972	47,353	179,015	739	55
75	Steuben .....	2,253	348,374	785,269	4,122	65
76	St. Joseph.....	5,622	247,461	872,554	5,700	198
77	Sullivan.....	4,758	331,028	979,300	6,912	650
78	Switzerland.....	5,435	106,198	543,460	3,526	320
79	Tippecanoe.....	4,675	482,206	1,606,212	9,095	696
80	Tipton .....	2,260	152,808	448,215	2,967	132
81	Union .....	550	357,450	642,424	2,469	129
82	Vanderburgh.....	25	105,243	483,687	2,856	1,186
83	Vermillion .....	3,881	241,419	597,764	3,551	292
84	Vigo .....	2,363	304,709	1,076,912	7,206	673
85	Wabash.....	2,001	278,685	1,088,990	6,658	192
86	Warren .....	1,991	696,322	1,014,702	4,126	324
87	Warrick .....	12,349	217,018	758,912	5,008	943
88	Washington ...	20,053	384,881	1,048,750	6,378	1,125
89	Wayne.....	785	757,681	1,362,920	7,189	252
90	Wells .....	11,618	251,127	816,517	5,206	89
91	White ...	1,966	301,366	884,977	4,292	329
92	Whitley.....	1,876	187,021	772,023	5,064	61

## PRODUCTIONS OF AGRICULTURE.—Continued.

Number.	COUNTIES.	LIVE STOCK.				
		Milch cows.	Working oxen.	Other cattle.	Sheep.	Swine.
		Number.	Number.	Number.	Number.	Number.
	Total.....	393,736	14,088	618,360	1,612,680	1,872,230
1	Adams.....	4,429	34	4,652	21,337	13,356
2	Allen.....	8,644	110	8,277	36,323	23,417
3	Bartholomew.....	4,372	79	7,737	15,838	38,546
4	Benton.....	1,906	140	8,148	5,143	8,566
5	Blackford.....	1,720	20	1,665	7,820	5,863
6	Boone.....	5,147	40	8,603	23,095	27,109
7	Brown.....	1,391	145	1,994	8,404	7,100
8	Carroll.....	4,208	60	6,580	19,942	18,338
9	Cass.....	4,361	44	6,137	18,186	14,706
10	Clarke.....	4,024	129	4,765	11,787	22,325
11	Clay.....	3,686	66	5,494	20,437	16,234
12	Clinton.....	5,890	138	7,239	25,537	28,542
13	Crawford.....	2,307	426	3,139	10,223	13,374
14	Daviess.....	4,122	120	7,160	25,205	27,689
15	Dearborn.....	4,621	158	4,081	6,017	10,820
16	Decatur.....	4,491	129	9,199	13,810	29,818
17	De Kalb.....	5,587	213	6,607	34,984	15,856
18	Delaware.....	4,546	80	6,783	23,793	24,274
19	Dubois.....	3,061	430	5,651	12,730	21,762
20	Elkhart.....	6,370	125	7,643	24,147	14,197
21	Fayette.....	2,631	22	5,145	8,105	20,879
22	Floyd.....	2,002	24	1,077	2,815	5,976
23	Fountain.....	3,977	6	6,966	26,389	23,910
24	Franklin.....	6,032	194	7,321	11,284	22,480
25	Fulton.....	3,817	113	4,811	14,940	10,533
26	Gibson.....	3,795	198	5,828	15,038	28,222
27	Grant.....	5,052	112	6,524	25,290	27,045
28	Greene.....	4,530	162	6,970	30,341	26,195
29	Hamilton.....	5,630	40	9,621	21,796	33,555
30	Hancock.....	3,986	14	5,350	13,449	22,042
31	Harrison.....	5,226	234	5,399	15,769	29,139
32	Hendricks.....	5,492	221	13,725	21,460	30,380
33	Henry.....	4,985	74	9,311	17,089	33,847
34	Howard.....	2,687	180	4,244	14,393	14,656
35	Huntington.....	5,094	38	5,544	21,058	20,565
36	Jackson.....	4,821	170	6,748	16,604	34,733
37	Jasper.....	3,192	105	11,167	7,038	5,078
38	Jay.....	4,192	44	4,308	24,938	16,866
39	Jefferson.....	5,289	284	6,722	18,921	19,757
40	Jennings.....	4,012	224	6,022	17,085	20,295
41	Johnson.....	4,279	41	8,192	13,775	30,006
42	Knox.....	4,632	167	7,404	18,907	33,110
43	Kosciusko.....	6,504	230	7,510	29,909	19,443
44	Lagrange.....	4,211	132	4,940	31,958	12,004
45	Lake.....	7,694	185	9,304	11,637	8,526
46	Laporte.....	6,135	238	9,197	15,031	15,386
47	Lawrence.....	3,564	380	9,604	19,984	23,489
48	Madison.....	5,145	35	7,702	22,820	29,885
49	Marion.....	6,424	108	7,597	13,173	27,989
50	Marshall.....	4,987	421	5,672	15,216	14,406
51	Martin.....	2,357	256	3,418	17,071	14,976
52	Miami.....	5,111	82	7,074	20,706	20,794
53	Monroe.....	3,451	263	6,392	18,272	18,614



PRODUCTIONS OF AGRICULTURE.—Continued.

Number	COUNTIES.	LIVE STOCK.				
		Milch cows.	Working oxen.	Other cattle.	Sheep.	Swine.
		Number.	Number.	Number.	Number.	Number.
54	Montgomery.....	6,590	122	15,699	37,533	34,879
55	Morgan.....	4,376	184	9,876	20,902	34,606
56	Newton.....	2,362	35	6,952	3,320	4,995
57	Noble.....	5,456	239	6,386	36,464	14,259
58	Ohio.....	1,350	31	1,255	2,742	4,342
59	Orange.....	3,724	601	6,344	17,390	25,164
60	Owen.....	4,632	210	8,321	30,285	24,685
61	Parke.....	5,104	185	10,142	31,583	32,264
62	Perry.....	2,520	412	2,831	9,013	15,224
63	Pike.....	3,041	386	4,715	17,331	26,413
64	Porter.....	4,406	161	7,493	15,200	10,039
65	Posey.....	4,701	168	5,349	9,422	27,157
66	Pulaski.....	3,741	133	6,291	7,823	5,008
67	Putnam.....	5,729	227	19,009	34,227	26,777
68	Randolph.....	6,094	29	8,542	25,154	32,590
69	Ripley.....	6,127	274	7,586	18,358	18,556
70	Rush.....	6,123	113	10,861	15,921	40,552
71	Scott.....	1,603	76	2,233	9,652	8,815
72	Shelby.....	5,202	24	7,904	14,250	34,918
73	Spencer.....	3,711	456	5,264	14,054	23,506
74	Starke.....	1,017	237	2,166	1,482	2,187
75	Steuben.....	3,823	200	5,038	32,387	11,332
76	St. Joseph.....	5,837	245	5,952	16,639	13,560
77	Sullivan.....	4,892	62	6,965	27,246	32,030
78	Switzerland.....	2,626	89	3,136	8,473	9,407
79	Tippecanoe.....	5,836	79	12,529	16,310	27,293
80	Tipton.....	2,059	88	3,003	10,762	11,835
81	Union.....	1,884	32	3,346	4,215	16,955
82	Vanderburgh.....	3,254	202	2,166	3,157	12,223
83	Vermillion.....	2,278	37	4,865	13,552	14,047
84	Vigo.....	4,767	107	6,581	19,009	23,118
85	Wabash.....	5,256	27	6,852	21,464	22,195
86	Warren.....	2,557	67	10,036	13,006	14,746
87	Warwick.....	3,457	439	4,889	16,479	21,736
88	Washington.....	5,235	197	8,569	18,296	29,176
89	Wayne.....	5,442	33	9,138	11,960	34,390
90	Wells.....	4,643	34	5,072	21,723	15,470
91	White.....	3,741	80	10,350	13,620	7,292
92	Whitley.....	5,403	151	6,201	21,263	12,397

## PRODUCTIONS OF AGRICULTURE.—Continued.

Number.	COUNTIES.	PRODUCED.				
		WHEAT.		Rye.	Indian corn.	Oats.
		Spring.	Winter.			
	Total.....	Bushels. 161,991	Bushels. 27,585,231	Bushels. 457,468	Bushels. 51,094,538	Bushels. 8,500,400
1	Adams.....	7	172,326	7,282	96,168	88,694
2	Allen.....	4,282	428,470	17,761	273,344	212,944
3	Bartholomew.....		491,424	1,729	1,529,675	111,839
4	Benton.....	13,066	37,447	11,942	458,857	121,842
5	Blackford.....	3	82,760	2,150	75,346	14,567
6	Boone.....	100	388,252	14,337	749,482	52,076
7	Brown.....		83,056	2,504	197,734	61,139
8	Carroll.....	115	521,574	1,523	401,635	65,738
9	Case.....	40	401,114	8,204	312,434	90,835
10	Clarke.....		119,368	3,111	612,192	136,296
11	Clay.....	32	192,086	6,197	367,654	93,068
12	Clinton.....	231	535,123	8,076	980,891	140,369
13	Crawford.....	18	64,419	695	234,458	63,968
14	Daviess.....	60	251,863	3,916	702,642	98,530
15	Dearborn.....	1,828	169,828	12,370	448,793	156,314
16	Decatur.....		382,304	3,400	960,167	72,712
17	De Kalb.....	32	348,908	2,015	219,566	198,945
18	Delaware.....	18	451,484	4,799	674,477	63,546
19	Dubois.....	200	120,436	2,623	373,817	110,868
20	Elkhart.....	59	541,943	6,842	268,538	108,430
21	Fayette.....		271,150	2,027	635,454	56,348
22	Floyd.....	29	47,413	988	124,807	66,110
23	Fountain.....		413,786	2,014	574,426	59,681
24	Franklin.....	70	396,704	6,677	771,074	143,148
25	Fulton.....	37	278,108	4,942	142,684	38,909
26	Gibson.....		457,260	725	757,933	39,807
27	Grant.....		374,574	9,107	540,453	68,349
28	Greene.....		190,647	5,340	784,195	101,410
29	Hamilton.....		548,039	1,821	972,500	77,164
30	Hancock.....		440,212	979	810,496	42,050
31	Harrison.....	68	255,779	2,196	507,072	171,700
32	Hendricks.....		376,992	2,319	975,825	53,501
33	Henry.....		601,721	1,305	1,152,164	98,677
34	Howard.....	20	287,855	7,370	355,407	34,031
35	Huntington.....	5	357,516	5,873	288,840	81,425
36	Jackson.....	40	191,437	3,644	861,520	143,737
37	Jasper.....	9,643	22,068	11,613	111,882	79,605
38	Jay.....	1,154	281,781	5,383	216,090	96,119
39	Jefferson.....	105	207,804	4,904	466,246	131,321
40	Jennings.....		147,879	802	402,268	88,242
41	Johnson.....		544,917	1,378	12,40,220	20,550
42	Knox.....		376,950	3,217	959,209	55,767
43	Kosciusko.....	60	528,442	3,499	276,820	73,591
44	Lagrange.....	54	445,677	1,646	344,882	58,488
45	Lake.....	47,804	15,594	6,242	189,947	364,008
46	Laporte.....	14,886	504,132	9,331	394,294	148,311
47	Lawrence.....		139,340	6,583	581,824	127,640
48	Madison.....		541,669	3,804	1,028,150	74,037
49	Marion.....	75	613,192	2,103	1,305,988	78,246
50	Marshall.....	297	319,501	5,285	193,005	50,534
51	Martin.....	100	102,188	4,591	360,680	72,394
52	Miami.....	747	484,070	4,653	417,930	100,757
53	Monroe.....		130,043	4,227	454,275	105,415

## PRODUCTIONS OF AGRICULTURE—Continued.

Number.	COUNTIES.	PRODUCED.				
		WHEAT.		Rye.	Indian corn.	Oats.
		Spring.	Winter.			
		Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
54	Montgomery.....	800	705,372	7,537	1,004,706	89,509
55	Morgan.....		328,131	6,213	1,188,289	63,439
56	Newton.....	15,590	8,212	12,278	142,098	111,333
57	Noble.....	327	437,748	2,768	224,958	139,024
58	Ohio.....		61,833	12,213	221,565	10,224
59	Orange.....		156,622	1,080	498,740	145,600
60	Owen.....		202,612	14,803	602,098	100,216
61	Parke.....		502,230	3,378	982,628	48,391
62	Perry.....	2,792	52,432	342	288,705	62,496
63	Pike.....		167,262	493	566,709	53,064
64	Porter.....	23,930	119,645	4,433	212,331	178,886
65	Posey.....	320	393,610	126	931,936	80,633
66	Pulaski.....	4,797	82,843	12,035	60,512	25,186
67	Putnam.....	375	297,422	4,907	988,919	68,565
68	Randolph.....	232	534,771	3,645	740,051	147,992
69	Ripley.....	63	204,932	4,284	441,645	131,771
70	Rush.....	16	666,992	211	1,333,421	69,236
71	Scott.....	716	41,040	969	213,475	69,235
72	Shelby.....		669,509	1,570	1,500,448	40,227
73	Spencer.....		123,663	6,161	682,374	98,510
74	Starke.....	623	11,826	4,616	26,104	3,931
75	Steuben.....	503	232,313	2,047	352,200	97,719
76	St. Joseph.....	255	503,502	8,353	233,045	76,846
77	Sullivan.....		297,452	4,621	763,801	93,738
78	Switzerland.....	149	132,716	15,020	309,183	27,970
79	Tippecanoe.....	2,502	550,175	6,270	900,367	177,578
80	Tipton.....	20	149,801	10,723	357,815	21,487
81	Union.....		261,895	20	417,555	59,400
82	Vanderburgh.....	80	180,565	238	553,925	66,361
83	Vermillion.....	50	261,196	2,440	598,322	64,257
84	Vigo.....		354,132	6,322	832,372	96,179
85	Wabash.....	93	537,790	1,769	443,901	75,456
86	Warren.....	7,023	135,319	5,063	442,874	122,153
87	Warrick.....		159,743	2,236	601,054	123,143
88	Washington.....	3	213,375	942	681,399	253,229
89	Wayne.....		470,641	184	1,000,160	165,100
90	Wells.....	48	237,862	10,980	177,630	82,524
91	White.....	5,350	167,962	14,650	215,808	119,424
92	Whitley.....	50	290,456	2,913	192,813	88,595

## PRODUCTIONS OF AGRICULTURE—Continued.

Number.	COUNTIES.	PRODUCED.				
		Barley.	Buckwheat.	Rice.	Tobacco.	Cotton.
		Bushels.	Bushels.	Pounds.	Pounds.	Bales.
	Total.....	356,262	80,231	.....	9,325,392	3
1	Adams.....	1,137	958	.....	.....	.....
2	Allen.....	4,235	2,641	.....	255	.....
3	Bartholomew.....	3,045	740	.....	3,400	.....
4	Benton.....	685	225	.....	.....	.....
5	Blackford.....	300	292	.....	50	.....
6	Boone.....	1,492	343	.....	.....	.....
7	Brown.....	.....	520	.....	65,765	.....
8	Carroll.....	5,433	1,408	.....	70	.....
9	Cass.....	8,665	568	.....	300	.....
10	Clarke.....	756	329	.....	14,110	.....
11	Clay.....	1,269	2,655	.....	1,640	.....
12	Clinton.....	4,520	985	.....	2,690	.....
13	Crawford.....	.....	.....	.....	3,900	3
14	Davless.....	430	2,017	.....	39,830	.....
15	Dearborn.....	59,122	1,076	.....	.....	.....
16	Decatur.....	3,270	659	.....	3,412	.....
17	De Kalb.....	1,879	2,493	.....	.....	.....
18	Delaware.....	1,681	1,187	.....	1,455	.....
19	Dubois.....	6,122	108	.....	358,948	.....
20	Elkhart.....	732	2,218	.....	.....	.....
21	Fayette.....	6,527	8	.....	75	.....
22	Floyd.....	439	.....	.....	.....	.....
23	Fountain.....	75	216	.....	4,032	.....
24	Franklin.....	21,727	878	.....	995	.....
25	Fulton.....	630	805	.....	2	.....
26	Gibson.....	1,367	18	.....	182,031	.....
27	Grant.....	871	719	.....	125	.....
28	Greene.....	620	749	.....	112,242	.....
29	Hamilton.....	1,905	557	.....	3,407	.....
30	Hancock.....	2,455	544	.....	550	.....
31	Harrison.....	1,585	409	.....	9,865	.....
32	Hendricks.....	75	212	.....	3,611	.....
33	Henry.....	5,615	708	.....	1,600	.....
34	Howard.....	1,484	828	.....	720	.....
35	Huntington.....	1,332	813	.....	345	.....
36	Jackson.....	319	406	.....	4,262	.....
37	Jasper.....	120	458	.....	.....	.....
38	Jay.....	1,564	757	.....	.....	.....
39	Jefferson.....	40,028	580	.....	9,650	.....
40	Jennings.....	766	1,426	.....	5,681	.....
41	Johnson.....	665	223	.....	9,586	.....
42	Knox.....	900	1,022	.....	8,590	.....
43	Kosciusko.....	369	1,849	.....	100	.....
44	Lagrange.....	1,517	1,879	.....	.....	.....
45	Lake.....	4,754	3,465	.....	.....	.....
46	Laporte.....	4,348	3,444	.....	.....	.....
47	Lawrence.....	.....	24	.....	16,073	.....
48	Madison.....	2,650	904	.....	4,930	.....
49	Marion.....	2,042	434	.....	.....	.....
50	Marshall.....	1,222	2,663	.....	.....	.....
51	Martin.....	.....	891	.....	50,079	.....
52	Miami.....	5,545	842	.....	1,424	.....
53	Monroe.....	263	227	.....	15,947	.....

## PRODUCTIONS OF AGRICULTURE—Continued.

Number.	COUNTIES.	PRODUCED.				
		Barley.	Buckwheat.	Rice.	Tobacco.	Cotton.
		Bushels.	Bushels.	Pounds.	Pounds.	Bales.
54	Montgomery.....	2,015	360	.....	2,150	.....
55	Morgan .....	265	525	.....	11,127	.....
56	Newton.....	693	478	.....	.....	.....
57	Noble.....	4,536	4,426	.....	.....	.....
58	Ohio.....	13,581	148	.....	175	.....
59	Orange.....	.....	150	.....	25,050	.....
60	Owen.....	100	694	.....	2,915	.....
61	Parke.....	601	254	.....	6,130	.....
62	Perry.....	1,774	.....	.....	224,125	.....
63	Pike.....	257	.....	.....	1,119,356	.....
64	Porter.....	65	813	.....	.....	.....
65	Posey.....	38,321	190	.....	56,450	.....
66	Pulaski.....	146	1,027	.....	10	.....
67	Putnam.....	70	5	.....	140	.....
68	Randolph.....	2,882	650	.....	1,008	.....
69	Ripley.....	2,985	1,559	.....	5,104	.....
70	Rush.....	875	337	.....	553	.....
71	Scott.....	145	529	.....	16,700	.....
72	Shelby.....	12,754	1,006	.....	22,730	.....
73	Spencer.....	5,409	797	.....	3,019,970	.....
74	Starke.....	.....	1,316	.....	.....	.....
75	Steuben.....	520	4,608	.....	.....	.....
76	St. Joseph.....	755	2,089	.....	210	.....
77	Sullivan.....	173	1,245	.....	4,125	.....
78	Switzerland.....	13,324	543	.....	1,465	.....
79	Tippecanoe.....	3,040	476	.....	1,261	.....
80	Tipton.....	180	401	.....	1,000	.....
81	Union.....	2,407	30	.....	.....	.....
82	Vanderburgh.....	13,318	203	.....	167,150	.....
83	Vermillion.....	166	235	.....	290	.....
84	Vigo.....	1,209	883	.....	1,603	.....
85	Wabash.....	582	250	.....	4,000	.....
86	Warren.....	300	147	.....	120	.....
87	Warrick.....	1,072	298	.....	3,611,775	.....
88	Washington.....	70	24	.....	30,230	.....
89	Wayne.....	9,842	412	.....	52,330	.....
90	Wells.....	681	715	.....	.....	.....
91	White.....	404	1,283	.....	230	.....
92	Whitley.....	2,223	1,345	.....	157	.....

## PRODUCTIONS OF AGRICULTURE—Continued.

Number.	COUNTIES.	PRODUCED.				
		Wool.	Peas and beans.	POTATOES.		Wine.
				Irish.	Sweet.	
	Total.....	Pounds.	Bushels.	Bushels.	Bushels.	Gallons.
		5,029,022	35,523	5,309,044	150,705	19,479
1	Adams.....	62,957	.....	20,499	.....	.....
2	Allen.....	106,778	548	100,930	1,048	626
3	Bartholomew.....	47,590	971	67,352	2,041	46
4	Benton.....	20,097	79	22,426	104	61
5	Blackford.....	24,068	176	8,321	250	74
6	Boone.....	68,607	159	48,278	126	54
7	Brown.....	24,498	577	17,779	653	20
8	Carroll.....	69,452	161	36,834	972	58
9	Cass.....	56,444	322	55,077	1,241	49
10	Clarke.....	31,030	179	103,206	4,010	176
11	Clay.....	50,965	112	50,472	976	5
12	Clinton.....	87,861	532	53,270	557	30
13	Crawford.....	27,736	776	29,631	2,162	.....
14	Davies.....	63,382	393	39,895	3,276	32
15	Dearborn.....	18,777	167	66,503	1,482	3,010
16	Decatur.....	43,725	113	51,074	798	2
17	De Kalb.....	117,802	304	77,899	78	5
18	Delaware.....	76,251	328	45,387	730	73
19	Dubois.....	34,738	2,417	24,796	465	112
20	Elkhart.....	71,453	77	148,527	49	153
21	Fayette.....	31,208	2	26,118	885	13
22	Floyd.....	7,488	182	71,634	5,407	50
23	Fountain.....	90,028	885	58,609	821	60
24	Franklin.....	40,333	57	59,592	958	551
25	Fulton.....	45,754	256	41,897	187	.....
26	Gibson.....	37,440	7	22,979	1,225	6
27	Grant.....	84,824	259	41,657	328	10
28	Greene.....	79,319	88	39,639	212	.....
29	Hamilton.....	62,203	373	65,094	1,449	11
30	Hancock.....	141,244	174	47,149	601	.....
31	Harrison.....	37,403	94	156,259	6,595	22
32	Hendricks.....	70,233	283	47,620	2,526	605
33	Henry.....	64,953	156	62,599	3,804	645
34	Howard.....	46,429	265	37,668	994	20
35	Huntington.....	66,257	80	42,655	1,503	257
36	Jackson.....	47,648	322	65,894	1,553	423
37	Jasper.....	22,928	.....	20,673	.....	.....
38	Jay.....	78,866	60	24,106	324	20
39	Jefferson.....	35,707	5,980	98,952	6,822	2,563
40	Jennings.....	48,293	522	41,236	1,945	30
41	Johnson.....	45,363	222	50,392	1,432	296
42	Knox.....	56,237	129	46,235	3,510	1,672
43	Kosciusko.....	86,430	95	75,755	235	36
44	Lagrange.....	120,461	415	119,563	21	183
45	Lake.....	49,989	254	73,516	.....	145
46	Laporte.....	47,277	676	151,812	135	238
47	Lawrence.....	55,843	287	30,229	2,325	205
48	Madison.....	73,475	341	62,184	570	100
49	Marion.....	37,439	467	220,885	3,510	100
50	Marshall.....	39,526	314	84,994	284	59
51	Martin.....	39,501	702	21,588	602	110
52	Miami.....	66,643	325	61,687	2,179	135
53	Monroe.....	49,798	1,238	42,146	1,463	42

PRODUCTIONS OF AGRICULTURE—Continued.

Number.	COUNTIES.	PRODUCED.				
		Wool.	Peas and beans.	POTATOES.		Wine.
				Irish.	Sweet.	
		Pounds.	Bushels.	Bushels.	Bushels.	Gallons.
54	Montgomery .....	149,826	431	69,409	955	34
55	Morgan.....	61,471	510	48,402	2,270	321
56	Newton.....	8,456	43	18,855	10	.....
57	Noble.....	107,236	121	77,005	259	142
58	Ohio.....	8,658	80	89,379	280	.....
59	Orange.....	45,495	198	25,532	4,190	2
60	Owen.....	86,612	285	48,064	1,148	61
61	Parke.....	110,813	74	65,004	2,470	337
62	Perry.....	17,345	97	83,018	198	665
63	Pike.....	40,112	1,402	21,624	5,038	126
64	Porter.....	52,721	281	66,352	10	13
65	Posey.....	23,748	36	30,041	3,229	131
66	Pulaski.....	22,266	103	50,102	270	38
67	Putnam.....	125,320	1,263	54,659	3,051	154
68	Randolph.....	73,019	155	35,753	1,083	.....
69	Ripley.....	48,912	954	81,345	2,844	808
70	Rush.....	63,227	76	58,359	2,359	33
71	Scott.....	28,007	228	24,667	3,094	183
72	Shelby.....	39,494	391	61,361	887	110
73	Spencer.....	21,416	394	74,150	5,447	119
74	Starke.....	4,436	408	36,587	160	15
75	Steuben.....	117,337	490	89,049	71	11
76	St. Joseph.....	55,506	349	112,126	601	98
77	Sullivan.....	67,640	180	42,431	1,261	.....
78	Switzerland.....	20,964	310	125,878	238	320
79	Tippecanoe.....	54,286	483	94,516	2,178	148
80	Tipton.....	30,648	12	25,413	284	.....
81	Union.....	13,514	8	16,527	2,883	51
82	Vanderburgh.....	2,806	174	54,842	739	1,097
83	Vermillion.....	44,595	289	33,167	222	20
84	Vigo.....	56,637	474	141,319	2,749	200
85	Wabash.....	64,331	195	51,279	289	100
86	Warren.....	46,653	63	27,093	125	10
87	Warrick.....	30,979	332	43,799	17,627	138
88	Washington.....	48,386	119	33,803	2,209	63
89	Wayne.....	42,638	234	77,290	3,181	.....
90	Wells.....	63,335	173	27,758	511	40
91	White.....	55,758	106	55,687	347	218
92	Whitley.....	63,266	55	42,454	343	523

## PRODUCTIONS OF AGRICULTURE—Continued.

Number.	COUNTIES.	PRODUCED.					
		DAIRY PRODUCTS.			Hay.	SEED.	
		Butter.	Cheese.	Milk sold.		Clover.	Grass.
		Pounds.	Pounds.	Gallons.		Bushels	Bushels
	Total.....	22,915,385	283,807	936,983	1,076,768	61,166	17,377
1	Adams .....	227,303	32,847	21,625	12,408	1797	135
2	Allen .....	543,322	2,725	42,169	28,377	4356	218
3	Bartholomew.....	221,086	6,680	22,875	9,370	111	52
4	Benton .....	103,200	1,500	60	6,659	10	54
5	Blackford .....	111,106	2,126	25	3,734	42	135
6	Boone .....	261,816	30	3,200	9,041	6	102
7	Brown .....	67,754	1,025	.....	2,348	17	70
8	Carroll .....	236,988	445	.....	7,475	355	56
9	Cass.....	310,588	282	17,552	10,516	692	55
10	Clarke .....	224,376	100	21,383	9,020	.....	59
11	Clay .....	150,252	260	3,700	10,558	785	197
12	Clinton .....	502,253	548	760	10,767	609	202
13	Crawford .....	82,419	.....	18	3,744	83	122
14	Davless.....	208,468	.....	16,954	9,648	208	76
15	Dearborn.....	331,232	1,705	7,025	18,697	452	11
16	Decatur .....	194,402	200	2	12,034	795	99
17	De Kalb.....	444,407	23,480	.....	20,440	5622	11
18	Delaware.....	422,108	890	10,640	10,774	294	370
19	Dubois .....	45,738	525	.....	4,318	62	81
20	Elkhart .....	446,269	8,272	22,742	20,888	3162	47
21	Fayette .....	93,874	400	900	5,524	418	129
22	Floyd .....	93,243	.....	85,110	4,509	.....	.....
23	Fountain.....	257,196	684	.....	10,679	42	132
24	Franklin .....	369,005	5,000	5,828	9,267	476	270
25	Fulton .....	229,108	1,050	9,275	13,246	1831	14
26	Gibson .....	102,812	30	.....	7,564	568	3
27	Grant .....	375,214	2,371	350	9,448	48	211
28	Greene .....	160,598	4,184	354	7,833	127	860
29	Hamilton .....	336,215	2,250	775	9,791	131	256
30	Hancock .....	234,379	475	.....	6,308	.....	20
31	Harrison .....	196,377	1,980	.....	7,212	128	677
32	Hendricks.....	218,526	2,401	115	12,180	161	313
33	Henry .....	384,451	930	5,000	10,090	623	434
34	Howard .....	121,777	.....	10,000	4,250	314	36
35	Huntington .....	320,098	2,350	397	12,079	1564	242
36	Jackson .....	259,131	3,514	3,920	8,307	52	10
37	Jasper .....	126,132	12,450	100	25,129	.....	4
38	Jay .....	290,459	40	.....	10,852	484	363
39	Jefferson .....	408,565	1,035	21,520	20,933	140	241
40	Jennings .....	232,299	1,625	600	12,903	94	232
41	Johnson .....	300,915	313	1,975	6,376	45	109
42	Knox .....	137,185	543	20,000	7,331	100	18
43	Kosciusko.....	448,364	5,050	3,420	18,005	3901	43
44	Lagrange.....	243,649	1,560	25	18,139	3106	25
45	Lake .....	557,820	40,670	46,360	40,994	47	2336
46	Laporte .....	320,766	1,400	4,250	22,333	442	54
47	Lawrence .....	213,125	811	1,334	5,764	14	475
48	Madison .....	322,487	750	.....	10,385	341	292
49	Marion.....	378,963	1,430	263,860	17,464	33	55
50	Marshall .....	243,583	453	4,395	13,689	1888	80
51	Martin .....	120,481	150	510	3,241	174	95
52	Miami.....	372,457	10,690	372	17,560	1927	99
53	Monroe.....	253,078	1,365	5,795	7,311	55	322



## PRODUCTIONS OF AGRICULTURE—Continued.

Number.	COUNTIES.	PRODUCED.					
		DAIRY PRODUCTS.			Hay.	SEED.	
		Butter.	Cheese.	Milk sold.		Clover.	Grass.
		Pounds.	Pounds.	Gallons.	Tons.	Bush.	Bush.
54	Montgomery .....	391,403	1,771	989	18,104	910	293
55	Morgan .....	229,355	7,811	188	8,183	241	61
56	Newton .....	155,755	5,850	.....	14,854	.....	48
57	Noble .....	430,240	7,556	1,554	19,171	3979	27
58	Ohio.....	18,245	245	.....	6,489	7	804
59	Orange .....	245,381	320	1,118	3,904	1	68
60	Owen .....	168,606	400	747	9,253	647	468
61	Parke .....	314,099	2,900	7,050	14,512	374	172
62	Perry .....	74,300	52	575	5,544	.....	.....
63	Pike.....	121,671	.....	.....	4,067	22	1
64	Porter.....	220,998	160	3,696	21,841	43	5
65	Posey .....	118,408	480	50	7,027	2376	14
66	Pulaski .....	147,015	3,400	1,000	17,442	366	4
67	Putnam .....	332,383	850	14,495	15,990	00	108
68	Randolph .....	349,327	675	265	9,208	350	237
69	Ripley .....	380,911	11,602	8,235	19,504	98	256
70	Rush.....	389,552	2,624	940	11,038	454	204
71	Scott.....	131,080	10	.....	5,729	68	201
72	Shelby.....	414,863	1,070	12,400	8,574	257	79
73	Spencer .....	3,367	.....	80	7,878	80	.....
74	Starke .....	81,145	7,000	.....	7,716	7	4
75	Steuben .....	289,472	3,400	70	16,861	3436	25
76	St. Joseph.....	352,577	273	8,777	19,910	1104	34
77	Sullivan.....	176,279	115	25	9,305	.....	22
78	Switzerland ;.....	174,821	2,015	6,090	19,446	10	995
79	Tippecanoe .....	267,971	360	38,298	16,654	53	733
80	Tipton .....	179,905	.....	.....	4,892	18	40
81	Union.....	160,540	80	.....	2,699	173	74
82	Vanderburgh.....	115,502	1,200	1,000	9,852	1901	.....
83	Vermillion .....	145,253	.....	52	9,659	10	22
84	Vigo .....	316,076	330	35,057	13,950	127	252
85	Wabash .....	382,374	1,600	16,435	11,157	1136	99
86	Warren .....	107,505	400	.....	16,195	.....	64
87	Warrick ....	185,408	1,795	.....	11,282	535	80
88	Washington .....	320,309	1,190	800	8,546	129	359
89	Wayne .....	319,950	246	71,710	9,214	306	236
90	Wells.....	360,709	19,365	13,250	12,413	1064	221
91	White.....	227,304	4,870	3,657	20,994	17	71
92	Whitley .....	257,517	219	210	12,199	2047	130

## PRODUCTIONS OF AGRICULTURE—Continued.

Number.	COUNTIES.	PRODUCED.					
		Hops.	Hemp.	Flax.	Flaxseed.	SUGAR.	
						Cane.	Maple.
		Pounds.	Tons.	Pounds.	Bushels.	Hogsh'ds.	Pounds.
	Total.....	63,884	22	37,771	401,931	.....	1,332,332
1	Adams.....			24	9,635		12,649
2	Allen.....	3,151		199	16,986		9,078
3	Bartholomew.....	1,500			665		1,820
4	Benton.....			160	649		
5	Blackford.....				6,379		5,790
6	Boone.....			205	597		16,865
7	Brown.....	8		51	29		1,980
8	Carroll.....	42			11,267		28,336
9	Cass.....	76		2,870	11,934		12,481
10	Clarke.....	13			116		1,975
11	Clay.....	61		115	1		11,635
22	Clinton.....	10			6,392		4,889
13	Crawford.....			2,237	173		2,415
14	Davless.....			408	9		680
15	Dearborn.....	5,254		10	15		
28	Decatur.....	480			32		3,453
17	De Kalb.....			455	14,803		47,066
18	Delaware.....	11		52	21,631		7,122
19	Dubois.....	1,280		297	19		44
20	Elkhart.....			195	2,328		117,990
21	Fayette.....				6,707		6,899
22	Floyd.....			10	10		
23	Fountain.....	7					43,649
24	Franklin.....	5,305		8	6,588		2,130
25	Fulton.....	8			2,514		29,141
26	Gibson.....						300
27	Grant.....	3		424	28,068		18,856
28	Greene.....			300	19		2,733
29	Hamilton.....	16			5,020		11,749
30	Hancock.....			394	12,141		557
31	Harrison.....		5	533	236		332
32	Hendricks.....	19		330	99		2,977
33	Henry.....			602	28,288		31,387
34	Howard.....			938	5,941		8,321
35	Huntington.....	28		61	24,130		36,779
36	Jackson.....	370		592	55		1,888
37	Jasper.....				712		
38	Jay.....			202	18,946		45,003
39	Jefferson.....	1,600		145	122		1,847
40	Jennings.....			45	14		2,168
41	Johnson.....	2,287		25	1		3,945
42	Knox.....			200	1		11,245
43	Kosciusko.....			15	11,618		83,867
44	La Grange.....	2,280		30	5		25,132
45	Lake.....	5,778			100		
46	Laporte.....						16,928
47	Lawrence.....	16	10	930	13		18,628
48	Madison.....	5		318	15,537		18,403
49	Marion.....	16			298		2,618
50	Marshall.....	21					34,929
51	Martin.....	10		1,919	162		3,154
52	Miami.....	184		382	18,512		41,310
53	Monroe.....	47		3,603	38		11,117

PRODUCTIONS OF AGRICULTURE—Continued.

Number.	COUNTIES.	PRODUCED.					
		Hops.	Hemp.	Flax.	Flaxseed.	SUGAR.	
						Cane.	Maple.
		Pounds.	Tons.	Pounds.	Bushels.	Hogsh'ds.	Pounds.
54	Montgomery .....	10	.....	10	105	.....	34,344
55	Morgan .....	2,011	.....	380	45	.....	10,616
56	Newton... ..	.....	.....	795	150	.....	40
57	Noble .....	1,500	.....	.....	2,063	.....	39,578
58	Ohio.....	.....	.....	.....	.....	.....	60
59	Orange.....	15	.....	1,175	16	.....	4,674
60	Owen .....	14	.....	222	434	.....	24,389
61	Parke.....	.....	.....	.....	.....	.....	32,443
62	Perry .....	.....	.....	.....	.....	.....	300
63	Pike.....	1	.....	.....	.....	.....	2,240
64	Porter.....	1,645	.....	.....	.....	.....	5,895
65	Posey .....	.....	.....	.....	.....	.....	40
66	Pulaski .....	10	.....	30	96	.....	.....
67	Putnam .....	.....	.....	.....	.....	.....	33,289
68	Randolph. ....	12	.....	6,390	19,088	.....	13,318
69	Ripley.....	22,511	.....	645	20	.....	1,960
70	Rush .....	6	.....	.....	4,340	.....	21,576
71	Scott.....	540	.....	30	54	.....	1,180
72	Shelby. ....	3	.....	.....	248	.....	3,140
73	Spencer.....	.....	2	11	.....	.....	.....
74	Starke.....	.....	.....	.....	125	.....	424
75	Steuken.....	2,500	.....	5,891	599	.....	20,658
76	St. Joseph.....	924	.....	.....	1	.....	61,024
77	Sullivan.....	.....	.....	235	14	.....	42,250
78	Switzerland... ..	.....	.....	50	.....	.....	.....
79	Tippecanoe.....	.....	5	63	150	.....	6,201
80	Tipton .....	.....	.....	.....	134	.....	1,007
81	Union.....	.....	.....	372	3,951	.....	3,190
82	Vanderburgh.....	.....	.....	100	.....	.....	.....
83	Vermillion. ....	.....	.....	.....	.....	.....	10,485
84	Vigo.....	31	.....	166	10	.....	10,437
85	Wabash .....	.....	.....	145	22,628	.....	38,801
86	Warren.....	2	.....	.....	2,622	.....	708
87	Warrick. ....	1	.....	1,000	4	.....	300
88	Washington.....	9	.....	327	2,578	.....	3,426
89	Wayne .....	.....	.....	1	21,023	.....	21,579
90	Wells .....	3	.....	75	14,314	.....	35,902
91	White .....	250	.....	1	2,802	.....	305
92	Whitley .....	2,000	.....	375	14,764	.....	43,218

## PRODUCTIONS OF AGRICULTURE—Continued.

Number.	COUNTIES.	PRODUCED.				
		MOLASSES.			HONEY.	
		Cane.	Sorghum.	Maple.	Wax.	Honey.
		Gallons.	Gallons.	Gallons.	Pounds.	Pounds.
	Total.....		2,026,212	227,680	12,049	395,278
1	Adams .....		10,396	191	1	5,078
2	Allen .....		17,206	389	282	5,443
3	Bartholomew .....		34,761			1,693
4	Benton .....		4,661		14	8,365
5	Blackford .....		8,601	196	82	3,823
6	Boone .....		30,743	4,828	30	6,405
7	Brown .....		22,497		78	810
8	Carroll .....		6,997	3,506	75	3,118
9	Cass .....		9,272	3,199	90	2,052
10	Clarke .....		34,863			3,896
11	Clay .....		31,806	1,051	110	6,134
12	Clinton .....		24,300	7,409	239	6,506
13	Crawford .....		56,624	45	11	1,144
14	Daviess .....		46,139		7	5,589
15	Dearborn .....		23,307	536	110	3,009
16	Decatur .....		26,188	644	74	2,335
17	De Kalb .....		5,083	2,261	10	140
18	Delaware .....		22,009	991	82	7,093
19	Dubois .....		25,655	98	114	1,497
20	Elkhart .....		10,640	1,628	459	476
21	Fayette .....		5,302	6,896	12	2,125
22	Floyd .....		9,387	480	4	878
23	Fountain .....		10,158	7,680	231	6,325
24	Franklin .....		26,548	5,397	100	3,940
25	Fulton .....		11,463	2,104	322	3,900
26	Gibson .....		28,316	223	10	1,354
27	Grant .....		28,174	1,172	371	10,922
28	Greene .....		49,687	447	100	660
29	Hamilton .....		32,832	4,659	148	6,652
30	Hancock .....		26,492	1,040	63	1,180
31	Harrison .....		78,744	157	180	6,886
32	Hendricks .....		22,174	4,009	46	3,014
33	Henry .....		23,124	15,552	196	12,063
34	Howard .....		18,822	1,167	21	7,519
35	Huntington .....		13,820	4,528	149	2,312
36	Jackson .....		36,783	29	234	6,940
37	Jasper .....		9,662		15	7,450
38	Jay .....		19,746	2,426	213	8,791
39	Jefferson .....		50,851	799	374	4,973
40	Jennings .....		31,021	287	67	2,493
41	Johnson .....		15,565	4,846	32	525
42	Knox .....		23,989	1,161	29	2,401
43	Kosciusko .....		7,891	5,978	20	2,688
44	LaGrange .....		11,841	234	244	2,277
45	Lake .....		6,255		137	7,906
46	Laporte .....		12,112	55	212	3,044
47	Lawrence .....		24,350	2,766	112	3,312
48	Madison .....		30,782	2,915	173	12,116
49	Marion .....		15,714	5,488	73	1,942
50	Marshall .....		8,751	1,639	496	2,362
51	Martin .....		30,432	10	66	1,903
52	Miami .....		33,615	3,262	287	7,829
53	Monroe .....		32,664	2,353	50	969

## PRODUCTIONS OF AGRICULTURE—Continued.

Number.	COUNTIES.	PRODUCED.				
		MOLASSES.			BEES.	
		Cane.	Sorghum.	Maple.	Wax.	Honey.
		Gallons.	Gallons.	Gallons.	Pounds.	Pounds.
54	Montgomery .....		13,781	16,237	188	16,252
55	Morgan .....		27,988	2,383	127	2,970
56	Newton .....		5,011			2,635
57	Noble .....		7,543	3,675	601	3,864
58	Ohio .....		3,805		70	330
59	Orange .....		39,581	511	11	235
60	Owen .....		24,640	2,433	55	1,070
61	Parke .....		27,003	4,463	206	8,337
62	Perry .....		46,629	20	40	1,103
63	Pike .....		44,735		4	338
64	Porter .....		1,200	182	42	4,148
65	Posey .....		13,612		10	825
66	Pulaski .....		8,846		369	3,052
67	Putnam .....		21,207	11,270	128	8,979
68	Randolph .....		36,914	585	125	8,162
69	Ripley .....		46,713	229	9	3,281
70	Rush .....		16,989	20,359	365	7,075
71	Scott .....		30,814		185	2,151
72	Shelby .....		31,637	1,734	100	690
73	Spencer .....		49,006		108	1,407
74	Starke .....		5,004	34	59	6,812
75	Steuken .....		3,313	153	304	1,845
76	St. Joseph .....		3,891	5,833	677	625
77	Sullivan .....		39,166	1,038	63	3,441
78	Switzerland .....		17,342		295	2,390
79	Tippecanoe .....		10,741	1,518	37	12,276
80	Tipton .....		17,501	281		6,271
81	Union .....		3,234	7,267	35	8,578
82	Vanderburgh .....		9,858		97	1,650
83	Vermillion .....		10,593	1,341		3,415
84	Vigo .....		37,389	1,737	81	2,217
85	Wabash .....		14,675	2,506	51	1,387
86	Warren .....		4,893	80	73	12,300
87	Warrick .....		43,376		29	4,041
88	Washington .....		38,836	1,238	94	4,789
89	Wayne .....		18,591	12,833	212	5,030
90	Wells .....		9,342	2,547	151	7,005
91	White .....		12,428	9	147	11,413
92	Whitley .....		5,750	3,416	126	1,207

# SELECTED STATISTICS OF AGRICULTURE IN THE STATE OF INDIANA.

From the Ninth Census of the United States, 1870.

CIVIL DIVISIONS.	Improved land.	Value of farms and farming implements.	Value of live stock.	Value of all productions.	Indian Corn.
ALLEN.	Acres.	Dollars.	Dollars.	Dollars.	Bushels.
Adams .....	10,874	1,484,718	73,922	132,785	18,226
Cedar Creek .....	11,139	855,185	87,960	133,843	21,950
Eel River .....	9,481	673,580	99,744	145,545	17,781
Lafayette .....	10,121	720,933	94,418	126,550	19,983
Lake .....	8,165	547,455	73,256	111,422	14,456
Marion .....	10,869	776,692	73,833	120,827	18,410
Perry .....	11,008	905,257	87,196	131,079	21,031
Springfield .....	11,755	803,863	110,276	182,960	24,791
St. Joseph .....	8,473	649,645	68,817	108,657	15,896
Washington .....	9,973	1,219,931	78,432	131,016	15,461
BARTHOLOMEW.					
Clay .....	7,865	555,661	61,660	102,975	88,450
Clifty .....	9,187	532,050	58,045	111,085	103,010
Columbus .....	17,417	2,018,495	146,878	405,475	290,616
Flat Rock .....	10,530	931,025	91,740	164,325	148,860
German .....	9,088	1,251,675	101,854	237,902	204,190
Haw Creek .....	14,899	1,126,580	146,960	215,845	152,735
Nineveh .....	8,096	520,395	50,225	117,561	66,330
Rock Creek .....	9,619	619,210	74,545	106,925	103,680
Sand Creek .....	8,392	739,740	88,487	164,266	161,400
Wayne .....	13,758	866,560	90,080	186,793	129,306
BENTON.					
Bolivar .....	18,619	699,115	135,871	232,512	51,550
Oak Grove .....	17,059	667,710	183,172	306,750	112,737
Parish Grove .....	30,830	1,005,615	106,978	214,304	47,900
Prairie .....	5,143	121,065	32,591	139,805	46,750
BLACKFORD.					
Licking .....	9,361	498,780	79,067	112,347	34,129
BOONE.					
Center .....	14,463	1,196,014	173,884	151,463	78,807
Clinton .....	8,467	558,725	75,880	652,405	49,100
Eagle .....	11,913	958,041	117,721	177,436	75,075
Jackson .....	15,960	1,040,150	174,942	207,571	88,335
Jefferson .....	16,158	1,054,037	159,507	165,842	64,800
Marion .....	10,236	737,165	137,894	169,403	86,930

## AGRICULTURAL STATISTICS—Continued.

CIVIL DIVISIONS.	Improved land.	Value of farms and farming implements.	Value of live stock.	Value of all productions.	Indian corn.
	Acres.	Dollars.	Dollars.	Dollars.	Bushels.
<b>BOONE—continued.</b>					
Sugar Creek .....	11,710	924,780	65,700	971,553	47,120
Union .....	9,108	678,835	109,941	146,627	77,575
Washington .....	11,526	812,620	83,200	939,645	44,200
<b>CARROLL.</b>					
Burlington .....	8,164	622,085	70,465	123,305	41,795
Carrollton .....	9,115	696,025	79,310	110,218	33,970
Deer Creek .....	11,749	1,310,567	109,544	190,111	59,650
Democrat .....	7,489	498,855	62,140	100,225	41,129
Rock Creek .....	8,873	695,605	72,235	122,900	43,559
Tippecanoe .....	8,581	747,097	64,663	119,469	50,695
<b>CASS.</b>					
Clay .....	6,778	573,358	56,412	110,861	26,390
Deer Creek .....	8,961	689,355	76,460	135,380	34,565
Harrison .....	7,849	551,625	63,584	105,160	19,360
Jefferson .....	7,683	642,985	58,833	108,505	27,105
Noble .....	6,312	581,672	57,373	112,791	20,309
Tipton .....	7,916	715,100	62,425	127,083	29,095
<b>CLARKE.</b>					
Charleston .....	23,481	1,782,719	178,029	259,739	154,005
Jeffersonville .....	7,991	1,104,435	60,434	166,948	67,919
Utica .....	7,998	1,178,805	73,482	114,699	84,027
<b>CLAY.</b>					
Harrison .....	13,827	669,910	88,964	134,462	89,989
<b>CLINTON.</b>					
Jackson .....	37,178	3,236,758	358,600	661,667	267,103
Johnson .....	14,328	773,810	133,837	158,763	85,760
Kirklin .....	9,614	518,822	92,322	115,780	63,679
Madison .....	9,299	828,727	80,002	159,254	56,365
Michigan .....	10,010	604,344	102,650	138,093	80,060
Owen .....	9,290	520,340	90,765	117,043	49,609
Perry .....	12,490	808,360	106,472	245,124	78,940
Ross .....	15,613	1,595,681	165,250	292,237	105,875
Warren .....	11,040	689,959	105,500	128,122	62,735
Washington .....	15,100	1,274,339	118,390	258,897	93,905
<b>DAVIES.</b>					
Barry .....	25,459	1,323,455	183,774	392,960	124,481
Bogard .....	8,135	400,280	87,220	105,808	52,540
Elmore .....	6,295	319,050	66,850	109,565	62,875
Harrison .....	8,926	473,369	82,283	112,115	70,939
Madison .....	11,053	511,513	85,965	124,041	50,800
Reynolds .....	13,321	603,980	115,376	208,582	99,680
Van Buren .....	9,155	440,200	78,685	113,901	46,192
Washington .....	16,994	1,453,057	159,647	227,493	120,595
<b>DEARBORN.</b>					
Kelso .....	10,738	522,283	79,764	118,748	24,206
Manchester .....	16,799	953,028	127,637	179,817	43,779
Miller .....	11,268	532,100	53,065	135,320	39,948
Sparta .....	10,441	531,243	75,568	115,864	35,667

## AGRICULTURAL STATISTICS—Continued.

CIVIL DIVISIONS.	Improved land.	Value of farms and farming implements.	Value of live Stock.	Value of all productions.	Indian corn.
<b>DECATUR.</b>	<b>Acres.</b>	<b>Dollars.</b>	<b>Dollars.</b>	<b>Dollars.</b>	<b>Bushels.</b>
Adams.....	12,607	921,665	140,723	190,134	95,350
Clay.....	20,643	1,481,135	206,532	299,042	190,430
Fugit.....	14,352	1,054,495	157,530	213,862	92,175
Jackson.....	17,788	1,100,855	152,735	224,640	136,815
Marion.....	16,569	722,630	108,685	131,817	61,570
Sand Creek.....	15,844	892,408	138,710	185,333	123,675
Washington.....	25,269	2,057,361	350,997	467,963	195,560
<b>DE KALB.</b>					
Butler.....	9,182	665,575	76,090	109,370	25,504
Concord.....	13,086	780,675	98,607	172,323	27,825
Fairfield.....	11,238	984,263	103,928	169,340	31,217
Franklin.....	10,102	731,189	86,071	122,177	18,755
Jackson.....	10,461	912,337	96,689	124,206	13,811
Richland.....	16,544	905,671	90,042	138,516	18,782
Smithfield.....	10,086	817,985	88,306	131,704	19,441
Wilmington.....	10,193	642,881	72,897	121,264	15,005
<b>DELAWARE.</b>					
Centre.....	11,403	1,471,685	135,125	214,369	67,155
Delaware.....	9,054	519,680	90,314	116,252	53,568
Harrison.....	19,428	681,410	99,858	119,319	51,940
Liberty.....	13,614	1,145,928	127,070	177,093	54,045
Monroe.....	12,471	1,044,528	106,134	170,873	48,631
Mount Pleasant.....	10,627	828,160	104,140	184,719	82,295
Perry.....	11,814	879,205	110,740	182,712	70,705
Salem.....	12,608	1,168,008	111,164	196,708	80,090
Washington.....	9,141	601,850	71,352	132,970	54,960
<b>DUBOIS.</b>					
Bainbridge.....	17,337	469,946	114,848	166,953	88,840
Hall.....	10,050	252,214	61,979	153,494	43,785
Harbison.....	10,726	422,820	81,677	156,094	89,680
Patoka.....	17,541	536,387	94,735	239,234	79,842
<b>ELKHART.</b>					
Clinton.....	11,613	1,124,300	105,827	128,720	17,061
Concord.....	13,971	1,686,831	93,777	154,180	29,485
Elkhart.....	13,747	1,817,566	91,792	166,220	35,167
Harrison.....	10,063	1,022,122	92,011	104,975	11,115
Jackson.....	10,357	1,136,780	68,156	105,593	18,487
Jefferson.....	10,767	928,050	79,693	108,552	21,495
Middlebury.....	13,310	1,236,395	105,022	166,981	40,574
Washington.....	10,288	930,070	57,463	101,968	21,525
<b>FAYETTE.</b>					
Columbia.....	8,576	443,852	60,116	111,884	63,930
Connersville.....	12,787	1,254,527	107,138	185,762	118,667
Fairview.....	6,206	562,110	70,327	129,654	51,810
Harrison.....	10,012	1,055,070	127,092	218,653	99,300
Jackson.....	11,588	730,975	68,075	118,088	72,140
Orange.....	8,593	470,756	62,624	102,228	46,712
Posey.....	12,785	1,030,240	136,120	200,834	96,300
Waterloo.....	7,092	547,145	51,866	114,087	36,730



AGRICULTURAL STATISTICS—Continued.

CIVIL DIVISIONS.	Improved land.	Value of farms and farming implements.	Value of live stock.	Value of all pro- ductions.	Indian corn.
	Acres.	Dollars.	Dollars.	Dollars.	Bushels.
<b>FLOYD.</b>					
New Albany.....	8,784	1,257,376	75,435	172,358	29,087
<b>FOUNTAIN.</b>					
Cain.....	14,537	935,781	129,084	163,101	61,510
Jackson.....	11,351	689,151	126,245	141,507	58,610
Mill Creek.....	9,977	575,850	112,781	110,391	43,450
Richland.....	20,931	1,318,524	209,183	241,224	85,180
Shawnee.....	8,894	678,990	69,807	135,281	53,784
Troy.....	13,284	1,068,099	158,735	184,725	75,380
Wabash.....	11,214	725,207	97,434	139,717	62,175
<b>FRANKLIN.</b>					
Bath.....	7,572	870,518	74,247	140,875	49,945
Brookville.....	25,252	1,979,198	194,384	340,169	184,285
Highland.....	11,603	481,784	66,627	104,384	26,934
Laurel.....	9,928	603,270	94,733	142,531	83,805
Metamora.....	5,859	408,330	62,813	135,928	69,440
Ray.....	10,715	367,888	75,247	102,385	32,850
Salt Creek.....	7,173	318,011	79,538	107,602	45,760
Springfield.....	14,753	1,404,600	117,030	234,184	78,775
Whitewater.....	13,922	1,017,453	87,422	170,119	65,495
<b>FULTON.</b>					
Henry.....	12,630	849,280	106,833	148,422	29,938
Richland.....	11,497	630,883	90,631	119,624	23,829
Rochester.....	9,658	719,441	80,207	135,925	25,503
<b>GIBSON.</b>					
Barton.....	12,892	626,182	102,441	160,038	71,551
Columbia.....	12,450	696,165	93,660	194,297	102,861
Johnson.....	19,308	1,531,088	164,778	295,884	123,508
Montgomery.....	25,050	1,574,467	189,580	406,305	187,167
Patoka.....	22,277	1,321,143	171,766	262,412	151,471
<b>GRANT.</b>					
Centre.....	10,608	919,855	90,723	124,820	52,870
Fairmount.....	10,680	829,976	94,674	149,827	49,012
Franklin.....	10,020	770,120	100,543	137,872	43,079
Jefferson.....	12,066	808,301	108,100	163,302	66,085
Liberty.....	11,508	909,220	116,121	201,681	73,760
Mill.....	8,345	716,420	69,300	102,985	45,450
Pleasant.....	12,530	911,850	127,689	156,323	53,480
Washington.....	12,121	769,264	85,831	146,251	38,065
<b>GREENE.</b>					
Beech Creek.....	15,177	466,735	89,821	185,989	54,354
Centre.....	13,627	393,624	76,887	166,252	57,725
Highland.....	9,861	444,867	61,865	103,416	81,210
Richland.....	10,940	487,074	75,998	109,226	85,175
<b>HAMILTON.</b>					
Adams.....	11,200	892,908	132,043	176,451	88,455
Clay.....	10,539	863,794	69,268	173,684	91,051
Delaware.....	10,536	829,460	117,030	129,529	94,365
Fall Creek.....	11,510	863,085	126,868	127,906	67,354

## AGRICULTURAL STATISTICS—Continued.

CIVIL DIVISIONS.	Improved land.	Value of farms and farming implements.	Value of live stock.	Value of all productions.	Indian corn.
	Acres.	Dollars.	Dollars.	Dollars.	Bushels.
<b>HAMILTON—Continued.</b>					
Jackson .....	16,948	1,293,642	152,000	217,943	128,095
Noblesville .....	15,606	1,417,602	136,073	231,684	130,395
Washington .....	20,332	1,557,946	221,688	354,729	163,856
Wayne.....	11,984	969,267	129,144	138,738	80,814
White River.....	17,329	1,438,035	234,116	195,421	128,275
<b>HANCOCK.</b>					
Blue River.....	9,951	709,810	80,421	157,918	74,505
Brandywine .....	8,535	670,805	66,832	117,645	65,091
Brown.....	10,896	819,690	89,915	151,651	89,950
Buck Creek.....	9,023	715,087	81,218	138,624	76,980
Center.....	16,624	1,393,427	146,337	283,259	151,525
Green.....	9,954	768,340	85,782	141,261	74,965
Jackson .....	12,899	1,105,685	126,664	189,965	116,285
Sugar Creek.....	11,094	1,006,809	109,164	174,161	97,065
Vernon .....	9,857	767,413	81,295	127,761	64,130
<b>HARRISON.</b>					
Boone .....	12,794	461,238	71,685	107,338	39,060
Harrison .....	23,857	980,568	123,413	207,314	90,954
<b>HENDRICKS.</b>					
Brown.....	8,340	661,530	82,685	108,325	67,245
Centre.....	15,133	1,768,320	219,102	196,986	113,200
Eel River.....	11,923	1,162,616	198,691	186,594	106,906
Guilford .....	11,514	1,368,870	153,742	162,807	126,680
Liberty.....	15,061	1,472,987	202,937	199,228	109,134
Lincoln.....	8,355	750,230	94,061	113,575	63,519
Marion .....	12,493	1,307,880	191,553	170,993	74,155
Middle.....	8,908	752,949	112,456	112,534	63,678
Washington.....	13,981	1,215,945	148,531	211,149	101,210
<b>HENRY.</b>					
Blue River.....	8,830	700,638	68,386	121,249	54,767
Dudley.....	12,800	1,071,455	136,690	198,450	112,165
Fall Creek.....	11,559	1,213,728	104,414	184,203	100,574
Franklin.....	11,951	925,440	116,020	196,910	109,240
Greensboro.....	8,410	685,030	91,231	147,607	67,680
Harrison.....	12,743	1,032,242	124,183	234,430	112,490
Henry .....	10,811	892,306	102,363	188,964	88,615
Jefferson .....	8,507	721,734	79,012	125,408	52,250
Liberty.....	15,997	1,470,960	157,339	248,190	101,203
Prairie.....	14,097	1,248,001	133,987	233,139	101,100
Spiceland .....	10,085	1,029,050	118,504	194,347	92,930
Wayne.....	13,744	1,223,475	142,150	202,293	114,915
<b>HOWARD.</b>					
Howard .....	9,216	528,325	58,140	141,721	53,763
Liberty.....	8,981	429,861	57,072	123,310	43,622
Taylor.....	8,360	504,385	54,162	120,158	53,450
Union .....	8,846	515,955	72,522	113,599	48,453
<b>HUNTINGTON.</b>					
Clear Creek.....	11,123	956,413	99,042	163,120	29,151
Huntington.....	10,296	827,300	59,982	105,835	28,675
Jackson .....	9,949	935,875	101,782	170,199	24,648

AGRICULTURAL STATISTICS—Continued.

CIVIL DIVISIONS.	Improved land.	Value of farms and farming implements.	Value of live stock.	Value of all productions.	Indian corn.
	Acres.	Dollars.	Dollars.	Dollars.	Bushels.
<b>RUSTINGTON—continued.</b>					
Jefferson .....	15,230	646,690	82,409	103,381	32,800
Rock Creek.....	10,379	714,513	83,000	116,082	26,805
Salamonie .....	10,832	697,990	81,515	107,527	32,307
Union .....	6,982	535,427	64,848	100,981	17,996
<b>JACKSON.</b>					
Brownstown.....	15,327	812,350	99,591	160,975	134,945
Carr.....	14,720	673,965	89,970	132,477	109,755
Driftwood .....	9,002	460,028	56,508	101,752	71,075
Grassy Fork.....	10,859	434,372	72,305	111,299	56,695
Hamilton.....	12,014	618,358	102,749	153,322	103,992
Jackson .....	11,398	891,039	83,808	139,460	77,324
Redding .....	12,872	674,690	85,800	134,596	102,500
Salt Creek.....	12,212	321,500	71,500	111,097	57,804
Vernon.....	12,154	479,107	78,095	119,584	47,450
Washington ...	9,731	531,800	76,255	133,330	48,125
<b>JASPER.</b>					
Barkley.....	7,025	844,602	129,146	112,652	15,238
Marion.....	13,279	591,034	147,989	105,161	29,020
<b>JAY.</b>					
Noble.....	10,046	538,925	80,217	121,682	21,372
Pike .....	10,644	592,215	90,758	111,653	29,054
<b>JEFFERSON.</b>					
Graham.....	16,683	631,341	113,650	130,260	57,106
Madison.....	22,950	1,331,827	189,609	304,790	86,538
Milton.....	13,919	728,209	118,565	131,744	46,240
Monroe .....	12,028	586,320	113,587	156,508	43,465
Saluda.....	13,296	559,235	108,128	114,271	46,227
Shelby.....	20,110	1,004,605	164,026	159,937	61,570
Smyrna.....	10,336	471,768	88,890	151,876	46,495
<b>JENNINGS.</b>					
Genevia.....	15,550	693,298	128,476	229,737	99,300
Marion .....	11,933	411,075	68,965	115,664	53,216
Montgomery.....	12,785	482,285	73,903	115,298	39,755
Spencer.....	14,965	600,168	92,040	175,250	62,700
Vernon.....	13,473	556,501	76,853	131,901	36,375
<b>JOHNSON.</b>					
Blue River.....	8,886	1,097,210	94,365	370,769	123,515
Clark.....	12,535	986,627	133,729	159,545	134,188
Franklin.....	28,934	2,208,160	276,596	386,514	287,193
Hensley.....	12,402	873,920	147,412	383,729	115,390
Kineveh .....	15,391	1,367,965	178,481	490,710	146,180
Pleasant.....	13,041	1,088,058	153,400	176,238	119,305
Union .....	13,087	890,049	131,188	155,335	109,236
White River.....	17,231	1,350,177	167,491	210,482	182,555
<b>KNOX.</b>					
Bussaron.....	12,479	437,390	81,118	110,365	111,665
Decker.....	5,775	310,179	72,581	126,975	87,600
Harrison.....	16,853	772,269	145,046	264,697	137,286

## AGRICULTURAL STATISTICS—Continued.

CIVIL DIVISIONS.	Improved land.	Value of farms and farming implements.	Value of live stock.	Value of all productions.	Indian corn.
	Acres.	Dollars.	Dollars.	Dollars.	Bushels.
<b>KNOX—continued.</b>					
Johnson.....	10,774	563,190	102,351	171,471	97,322
Palmyra.....	10,985	774,022	100,502	212,806	81,680
Steen .....	7,734	476,234	71,726	132,482	57,910
Vigo.....	14,371	563,985	106,297	145,425	119,590
Vincennes.....	8,594	504,704	70,303	129,644	73,666
Washington .....	17,083	870,880	128,168	169,320	115,806
Widner.....	12,853	536,155	93,060	123,575	77,285
<b>KOSCIUSKO.</b>					
Clay.....	12,665	1,101,338	109,074	187,202	23,711
Franklin.....	8,387	744,481	87,389	112,296	19,655
Harrison.....	10,079	818,451	79,236	100,692	13,275
Jackson .....	9,299	803,806	87,228	151,909	30,275
Prairie.....	9,746	784,450	83,185	101,795	28,440
Seward.....	8,475	656,080	75,297	103,944	13,310
Tippecanoe.....	9,008	643,940	66,290	103,430	20,400
Washington .....	10,105	920,290	86,952	140,860	20,645
Wayne.....	11,733	1,038,095	97,059	158,851	20,700
<b>LAGRANGE.</b>					
Bloomfield.....	9,447	927,228	78,997	109,771	26,902
Clear Spring.....	9,283	927,689	79,811	119,677	24,775
Greenfield .....	14,825	1,256,920	101,113	184,205	63,320
Johnson.....	9,254	870,199	67,281	112,219	28,591
Lima .....	9,655	901,088	67,606	118,090	26,915
Milford.....	10,243	839,690	77,735	133,640	44,661
Newbury.....	9,240	851,373	82,272	108,810	17,725
Springfield .....	10,607	753,821	77,127	144,537	44,285
Van Buren.....	12,507	907,230	88,158	110,337	32,701
<b>LAKE.</b>					
Cedar Creek.....	12,204	581,073	139,057	136,378	28,486
Center.....	9,474	532,330	89,050	102,016	13,480
Eagle Creek.....	12,244	527,155	129,398	133,743	26,015
Ross.....	20,249	896,305	167,245	119,506	37,507
West Creek.....	22,729	1,035,565	184,633	199,143	33,875
<b>LAPORTE.</b>					
Center.....	18,374	1,939,472	83,509	222,113	48,510
Clinton.....	16,731	899,026	95,085	127,049	30,220
Cool Spring.....	4,611	472,025	60,442	117,209	11,068
Kankakee.....	13,779	889,630	73,935	159,610	50,110
New Durham.....	4,929	452,615	39,314	109,642	21,313
Noble.....	17,076	911,352	114,048	158,673	39,488
Pleasant.....	13,243	976,475	78,866	130,540	40,985
Scipio .....	14,764	1,601,258	118,248	323,483	53,619
<b>LAWRENCE.</b>					
Indian Creek .....	18,377	762,320	171,310	170,745	64,529
Marion. ....	23,159	875,834	136,928	133,152	103,515
Shawswick .....	21,399	972,116	193,598	163,735	96,545
<b>MADISON.</b>					
Adams.....	10,917	759,257	117,282	208,966	91,163
Anderson.....	10,681	1,049,974	97,053	207,899	96,141
Boone .....	7,318	505,070	83,240	114,791	54,748

AGRICULTURAL STATISTICS—Continued.

CIVIL DIVISIONS.	Improved land.	Value of farms and farming implements.	Value of live stock.	Value of all productions.	Indian corn.
	Acres.	Dollars.	Dollars.	Dollars.	Bushels.
<b>MADISON—continued.</b>					
Fall Creek.....	14,705	1,235,870	124,829	270,973	115,950
Green.....	7,070	482,303	65,560	109,380	47,570
Jackson.....	10,127	724,539	89,749	141,676	66,475
Lafayette.....	9,766	655,146	95,104	181,370	76,202
Monroe.....	16,777	1,005,463	161,596	238,179	134,547
Pipe Creek.....	13,546	835,170	125,442	208,008	107,585
Richland.....	11,298	884,578	96,203	219,541	95,894
<b>MARION.</b>					
Centre.....	11,836	3,798,977	173,459	378,952	155,235
Decatur.....	10,418	1,153,144	120,071	239,036	115,325
Franklin.....	15,720	1,377,180	146,409	223,478	113,225
Lawrence.....	16,691	1,427,271	103,843	179,205	96,730
Perry.....	17,312	2,508,303	204,597	389,864	177,785
Pike.....	15,925	1,779,920	175,661	332,693	168,265
Warren.....	12,522	1,509,790	100,610	195,456	96,265
Washington.....	18,195	3,005,275	208,215	354,675	196,300
Wayne.....	20,198	3,001,825	241,890	515,490	186,178
<b>MARSHALL.</b>					
Centre.....	15,510	1,391,345	116,037	186,850	40,897
Union.....	10,144	613,670	80,893	106,320	20,723
Walnut.....	8,453	845,235	69,843	111,258	26,172
West.....	9,506	629,143	66,964	100,486	19,839
<b>MIAMI.</b>					
Butler.....	7,202	514,340	72,140	133,262	45,353
Jefferson.....	11,342	1,118,965	97,389	195,535	48,797
Perry.....	10,885	753,460	127,675	159,070	22,807
Pern.....	6,302	633,450	63,793	112,798	30,504
Richland.....	12,551	1,014,935	143,935	208,695	47,745
<b>MONROE.</b>					
Bloomington.....	12,249	493,307	90,008	123,150	55,229
Richland.....	12,174	590,173	113,403	123,375	48,100
<b>MONTGOMERY.</b>					
Brown.....	15,843	1,654,283	280,278	258,018	96,580
Clark.....	10,881	1,441,015	188,387	191,268	113,765
Coal Creek.....	19,932	1,308,940	196,086	195,059	75,665
Franklin.....	12,248	1,126,575	132,026	221,711	93,860
Madison.....	11,426	666,348	101,422	111,923	39,430
Ripley.....	11,861	1,032,660	123,052	187,324	82,945
Scott.....	9,802	1,170,135	185,539	176,715	83,605
Sugar Creek.....	14,009	951,235	123,531	127,194	56,603
Union.....	34,549	3,403,044	364,318	596,293	212,130
Walnut.....	10,766	978,510	138,217	129,032	84,683
Wayne.....	13,662	1,104,735	132,534	175,649	65,440
<b>MORGAN.</b>					
Adams.....	10,151	490,155	81,905	103,930	81,845
Brown.....	8,823	898,375	101,959	117,490	97,150
Clay.....	10,419	556,725	74,118	132,728	103,822
Green.....	12,722	759,465	104,330	199,932	104,800
Jackson.....	13,278	613,422	106,834	148,597	74,267
Jefferson.....	9,253	567,155	81,770	128,230	88,070

## AGRICULTURAL STATISTICS—Continued.

CIVIL DIVISIONS.	Improved land.	Value of farms and farming implements.	Value of live stock.	Value of all productions.	Indian corn.
	Acres.	Dollars.	Dollars.	Dollars.	Bushels.
<b>MORGAN—continued.</b>					
Madison .....	8,414	859,612	120,726	132,234	133,160
Monroe.....	8,621	810,281	113,859	117,280	89,030
Washington .....	19,862	1,520,470	167,785	273,780	161,330
<b>NOBLE.</b>					
Allen.....	13,065	1,040,472	104,835	176,537	23,003
Elkhart.....	9,516	865,615	83,044	120,736	18,368
Jefferson .....	10,396	875,383	92,770	145,472	12,655
Orange.....	10,112	882,108	80,089	143,673	24,191
Perry .....	12,162	1,317,885	105,304	187,621	30,825
Sparta.....	10,189	880,545	78,625	132,771	20,350
Swan .....	9,080	615,062	66,165	106,028	13,176
Wayne .....	9,747	846,231	79,432	142,948	21,235
York .....	8,200	493,183	78,675	114,661	15,690
<b>OHIO.</b>					
Randolph .....	16,565	1,676,385	99,340	235,100	128,240
<b>ORANGE.</b>					
North East .....	17,354	515,980	125,302	153,560	48,315
Orleans.....	21,852	959,351	113,933	104,230	73,790
Paoli .....	25,862	543,460	129,432	110,447	81,075
<b>OWEN.</b>					
Washington .....	13,668	954,884	132,489	150,407	91,577
Wayne .....	9,788	666,777	90,675	169,643	76,210
<b>PARKE.</b>					
Adams .....	22,663	1,473,497	203,211	250,575	110,193
Florida .....	16,083	890,999	145,134	215,217	116,435
Greene .....	17,106	1,006,200	169,180	200,495	105,060
Liberty.....	12,281	684,800	119,730	138,567	68,427
Penn .....	9,263	632,925	90,720	121,051	48,635
Raccoon .....	14,032	915,103	134,410	189,666	91,820
Reserve.....	10,436	715,465	88,650	147,592	83,320
Union .....	15,995	750,639	140,737	134,998	92,848
Washington .....	15,857	951,880	159,635	213,671	82,545
<b>PERRY.</b>					
Tobin.....	13,743	525,949	75,365	175,985	80,965
<b>PIKE.</b>					
Jefferson.....	13,953	525,119	73,569	169,871	101,645
Lockhart .....	11,187	323,633	86,084	116,410	72,686
Monroe .....	10,446	357,885	73,755	112,471	56,160
Washington .....	14,044	505,125	99,899	129,451	75,692
<b>PORTER.</b>					
Centre .....	9,785	671,925	82,530	104,180	23,245
Porter .....	28,786	805,814	144,316	177,824	38,350
<b>POSEY.</b>					
Black.....	22,981	1,847,176	158,445	287,856	220,70

AGRICULTURAL STATISTICS—Continued.

CIVIL DIVISIONS.	Improved land.	Value of farms and farming implements.	Value of live stock.	Value of all productions.	Indian corn.
POSEY—continued.	Acres.	Dollars.	Dollars.	Dollars.	Bushels.
Harmony.....	12,292	589,239	90,350	219,782	131,690
Lynn.....	11,883	699,160	78,580	172,023	102,080
Marr's.....	13,802	648,086	75,965	177,536	87,675
Point.....	6,864	264,063	70,783	147,366	83,875
Robb.....	12,413	623,772	96,139	224,235	109,856
Robinson.....	12,070	702,005	98,607	141,228	38,140
Smith.....	6,965	513,085	65,525	163,989	48,075
PULASKI.					
Indian Creek.....	11,725	426,760	69,815	137,781	14,634
Monroe.....	7,295	412,775	67,861	126,560	3,792
Tippecanoe.....	8,107	311,734	57,263	101,711	10,000
Van Buren.....	8,530	349,570	63,849	114,346	7,373
PUTNAM.					
Cloverdale.....	17,521	750,153	147,617	178,149	67,725
Floyd.....	12,633	924,080	174,347	122,481	91,031
Franklin.....	11,312	1,233,842	237,284	147,559	118,861
Greencastle.....	10,506	1,089,292	145,157	115,142	62,360
Jackson.....	12,295	826,110	148,440	112,575	91,530
Marion.....	12,059	1,035,559	173,498	111,196	71,785
Monroe.....	10,916	1,438,789	236,173	187,716	78,302
Russell.....	11,242	1,082,394	164,292	103,634	59,870
Washington.....	15,885	844,229	160,172	134,576	86,635
RANDOLPH.					
Greene.....	9,110	795,735	110,501	144,402	38,185
Green's Fork.....	16,631	1,068,223	148,365	157,620	93,330
Jackson.....	10,445	605,770	71,060	153,620	48,410
Monroe.....	9,936	823,032	99,225	140,815	61,360
Nettle Creek.....	11,636	700,090	91,615	110,412	71,430
Stony Creek.....	10,382	741,190	84,246	108,647	52,202
Ward.....	11,858	819,449	101,352	159,128	49,188
Washington.....	15,096	942,630	109,394	124,316	79,422
Wayne.....	12,764	868,814	91,133	158,309	51,792
West River.....	14,394	901,390	107,983	124,906	74,684
White River.....	20,967	1,511,194	160,437	260,621	87,598
RIPLEY.					
Brown.....	18,800	836,780	120,813	161,326	78,115
Delaware.....	10,003	639,918	79,245	114,183	37,715
Franklin.....	12,296	616,067	67,881	121,263	37,090
Johnson.....	16,220	825,335	106,835	162,550	61,095
Shelby.....	15,621	608,800	110,900	145,649	43,535
Washington.....	10,406	501,228	65,883	103,743	37,285
RUSH.					
Anderson.....	21,277	1,090,198	127,700	181,976	119,720
Centre.....	12,425	976,935	137,674	190,593	93,475
Jackson.....	12,708	899,570	109,600	174,320	97,710
Noble.....	18,405	1,377,115	218,494	249,413	116,605
Orange.....	14,441	870,400	103,368	138,420	90,375
Posey.....	11,927	956,370	116,200	197,305	107,590
Richland.....	17,821	1,070,614	133,405	161,996	86,931
Ripley.....	13,764	1,054,330	113,877	176,094	109,650
Rushville.....	24,592	1,884,025	199,975	307,375	167,365
Union.....	21,977	1,609,220	207,791	260,165	148,790

## AGRICULTURAL STATISTICS—Continued.

CIVIL DIVISIONS.	Improved land.	Value of farms and farming implements.	Value of live stock.	Value of all productions.	Indian corn.
	Acres.	Dollars.	Dollars.	Dollars.	Bushels.
<b>RUSH—continued.</b>					
Walker .....	14,063	737,511	87,567	146,448	89,000
Washington .....	11,382	784,495	134,894	120,367	106,270
<b>SCOTT.</b>					
Lexington.....	16,468	595,267	121,204	144,958	67,215
<b>SHELBY.</b>					
Addison .....	19,843	1,940,098	216,261	318,376	259,255
Brandywine.....	6,418	594,670	62,080	132,815	80,915
Hanover.....	9,290	862,655	107,275	121,918	100,461
Hendricks .....	11,430	1,075,675	94,010	205,045	119,655
Jackson.....	13,146	1,500,965	99,990	239,210	138,645
Marion.....	7,690	701,735	71,310	145,823	88,155
Moral.....	10,523	764,575	92,595	162,885	79,560
Noble.....	12,607	998,808	121,305	151,441	112,165
Sugar Creek.....	8,435	683,400	72,706	192,770	90,060
Union .....	10,377	778,336	112,076	157,142	111,537
Van Buren.....	7,295	661,605	83,520	167,479	103,060
Washington.....	12,635	1,133,365	117,965	189,734	147,950
<b>SPENCER.</b>					
Grass .....	14,262	353,630	98,740	137,295	80,975
Hammond.....	12,000	375,582	89,805	146,531	82,686
Luce.....	11,797	595,635	110,675	175,728	109,806
Ohio.....	15,804	713,547	99,256	193,803	161,470
<b>STEBEN.</b>					
Jackson .....	11,166	698,185	84,362	170,987	59,525
Millgrove.. ..	7,897	601,220	74,234	220,131	55,620
Pleasant.....	7,799	707,142	63,699	106,562	32,590
Salem.....	9,830	693,470	87,696	123,695	31,821
Steuben.....	8,658	674,420	89,169	123,280	35,973
<b>ST. JOSEPH.</b>					
German.....	8,759	799,288	52,138	110,486	23,837
Green.....	9,053	716,948	57,487	103,014	21,595
Harris.....	7,323	591,620	46,183	106,730	18,880
Madison.....	8,724	683,691	76,046	112,505	3,148
Olive.....	13,220	1,174,972	80,299	164,973	23,635
Penn.....	23,368	2,197,054	170,410	307,395	29,887
Portage.....	7,191	1,159,370	56,704	113,192	19,158
<b>SULLIVAN.</b>					
Curry.....	12,918	637,036	86,590	102,649	51,086
Fairbanks.....	13,869	625,710	104,870	125,381	61,825
Gill.....	12,798	699,687	121,636	157,711	108,120
Haddon.....	17,304	963,212	181,248	261,637	170,120
Hamilton.....	20,988	1,057,621	161,081	183,177	105,653
Jackson.....	11,617	550,423	81,800	103,573	60,904
Turman .....	11,970	513,152	114,382	149,226	95,185
<b>SWITZERLAND.</b>					
Cotton.....	14,695	930,990	82,416	118,073	40,810
Craig .....	13,216	959,130	98,510	136,188	42,855
Jefferson .....	14,939	785,043	103,355	156,178	56,668



AGRICULTURAL STATISTICS—Continued.

CIVIL DIVISIONS.	Improved land.	Value of farms and farming implements.	Value of live stock.	Value of all productions.	Indian corn.
	Acres.	Dollars.	Dollars.	Dollars.	Bushels.
<b>SWITZERLAND—continued</b>					
Pleasant.....	19,589	1,112,836	128,506	158,675	55,925
Posey.....	18,212	1,248,590	99,780	214,217	93,520
<b>TIPPECANOE.</b>					
Fairfield ..	9,853	1,073,639	89,415	150,508	55,055
Jackson .....	21,249	1,150,320	173,205	163,155	70,465
Laurens.....	20,816	1,097,986	182,557	190,565	57,508
Perry.....	10,703	960,011	109,239	161,893	50,668
Randolph.....	14,185	902,720	110,115	122,100	62,440
Sheffield.....	13,803	1,246,670	133,514	217,393	86,745
Tippecanoe.....	19,807	1,254,202	155,760	264,985	86,825
Wabash.....	19,596	1,321,897	153,417	230,806	65,028
Washington.....	7,378	487,170	68,718	112,697	32,135
Wayne.....	18,647	1,330,195	148,390	274,345	202,350
Wea.....	14,188	1,211,451	149,925	190,475	91,270
<b>TIPTON.</b>					
Cicero.....	12,877	1,000,255	123,325	213,129	101,365
Jefferson.....	9,152	526,380	80,665	130,150	73,015
Liberty.....	6,581	449,910	55,425	102,043	47,555
<b>UNION.</b>					
Brownsville.....	7,134	627,091	69,815	160,273	48,040
Center.....	11,809	1,396,620	125,615	321,781	89,400
Harmony .....	8,494	800,290	101,261	183,096	54,395
Harrison.....	10,497	1,212,580	118,913	245,427	80,070
Liberty.....	8,338	789,154	87,861	173,356	64,965
Union.....	12,481	1,502,897	138,959	307,352	80,685
<b>VANDERBURGH.</b>					
Armstrong.....	9,847	494,735	59,680	136,355	35,085
German.....	10,270	524,332	81,305	158,540	19,668
Knight.....	7,756	753,305	49,575	125,370	113,420
Perry .....	7,761	482,857	57,012	111,695	35,512
Scott.....	12,414	620,405	94,690	133,725	48,415
Union .....	7,984	578,830	66,735	127,480	245,375
<b>VERMILLION.</b>					
Clinton.....	11,995	694,610	94,430	142,922	98,095
Eugene .....	12,664	525,791	47,995	124,296	95,432
Helt.....	23,957	1,313,235	196,034	261,811	133,915
Highland .....	18,698	947,074	109,790	183,256	132,250
Vermillion .....	20,244	766,573	149,515	180,456	138,630
<b>VIGO.</b>					
Fayette.....	12,543	803,665	103,524	157,947	76,515
Harrison.....	6,989	960,404	67,743	133,795	73,365
Honey Creek.....	15,277	1,160,655	104,860	217,713	108,344
Linton .....	11,564	634,778	94,560	156,060	56,635
Lost Creek.....	10,551	859,981	93,767	138,383	35,498
Otter Creek.....	9,883	796,883	75,766	148,337	100,620
Pierson.....	12,664	549,670	105,413	137,047	66,490
Prairie Creek.....	10,042	470,575	91,355	110,464	72,505
Prairieton .....	7,409	435,939	60,502	113,955	83,784
Riley .....	11,230	642,410	97,420	130,784	50,795
Sugar Creek.....	10,697	802,815	105,605	134,092	67,211

## AGRICULTURAL STATISTICS—Continued.

CIVIL DIVISIONS.	Improved land.	Value of farms and farming implements.	Value of live stock.	Value of all productions.	Indian corn.
	Acres.	Dollars.	Dollars.	Dollars.	Bushels.
<b>WABASH.</b>					
Chester.....	17,423	1,315,872	148,146	199,961	35,065
La Gro.....	25,949	1,780,617	210,611	323,948	87,495
<b>WARREN.</b>					
J. Q. Adams.....	10,175	487,960	91,530	131,155	22,775
Liberty.....	11,473	628,580	112,879	141,723	52,629
Medina.....	12,451	697,842	127,704	329,597	65,229
Pine.....	11,010	551,475	105,789	188,539	56,655
Warren.....	8,774	495,428	78,284	118,116	42,322
<b>WARRICK.</b>					
Boone.....	27,045	1,254,176	190,116	326,684	148,585
Campbell.....	10,870	627,835	86,723	128,477	46,704
Hart.....	12,365	463,150	87,925	164,580	72,160
Ohio.....	11,102	653,455	88,565	164,375	76,640
Skelton.....	8,226	348,610	67,661	101,479	55,015
<b>WASHINGTON.</b>					
Gibson.....	11,290	330,910	87,279	106,782	51,480
Pierce.....	11,042	426,600	65,216	164,795	45,560
Washington.....	32,866	1,579,360	238,726	298,639	127,355
<b>WAYNE.</b>					
Boston.....	9,934	946,125	75,500	118,940	61,200
Centre.....	19,838	1,886,240	151,990	160,930	105,405
Franklin.....	10,608	859,883	104,095	170,352	63,505
Green.....	12,617	737,600	115,645	102,310	83,160
Harrison.....	6,948	772,675	54,823	114,959	43,795
Jackson.....	9,375	1,037,692	84,775	152,156	58,756
Jefferson.....	9,138	1,002,695	80,193	127,592	53,170
Washington.....	17,332	1,696,575	153,504	207,120	136,815
Wayne.....	23,119	3,215,246	192,281	293,567	136,925
<b>WELLS.</b>					
Chester.....	8,189	577,305	87,048	127,963	24,504
Harrison.....	12,906	1,058,893	129,576	214,917	32,327
Jackson.....	9,960	629,950	86,609	116,476	22,076
Jefferson.....	11,350	789,680	96,199	116,191	12,758
Lancaster.....	9,977	781,124	81,110	106,760	18,735
Nottingham.....	9,562	645,390	94,928	128,107	16,041
Rock Creek.....	9,996	747,245	92,301	130,656	21,626
Union.....	9,519	621,536	82,935	104,250	16,850
<b>WHITE.</b>					
Prairie.....	28,136	1,292,004	226,067	288,647	70,615
<b>WHITLEY.</b>					
Cleveland.....	13,762	989,825	105,207	165,602	32,392
Columbia.....	8,895	801,755	77,666	117,815	23,074
Richland.....	10,351	795,315	92,080	135,757	20,836
Smith.....	8,689	678,938	88,919	115,206	25,570
Thorn Creek.....	9,250	749,050	99,934	115,603	25,142
Union.....	8,597	730,886	87,438	123,136	19,536

# NUMBER AND SIZE OF FARMS IN INDIANA.

Selected from the Ninth Census of the United States, 1870.

COUNTIES.	NUMBER OF FARMS.							
	Of all sizes.	Under 3 acres.	3 and under 10.	10 and under 20.	20 and under 50.	50 and under 100.	100 and under 500.	500 and under 1,000.
Total .....	161,289	1,545	7,270	13,506	65,821	52,014	29,493	1,004
Adams .....	1553	3	61	172	655	508	154	
Allen .....	4918	08	265	600	214	1528	417	3
Bartholomew ..	1846	3	37	99	661	661	345	5
Benton .....	631		0	6	120	210	285	15
Blackford .....	780		59	116	359	212	14	
Bond .....	2607		352	296	949	680	218	1
Brown .....	908		24	78	358	271	90	
Carroll .....	1541		41	92	529	571	308	1
Cass .....	1356	2	17	54	463	585	214	1
Clarke .....	1828	0	66	128	445	557	320	1
Clay .....	1403	11	42	128	608	494	282	8
Clinton .....	2585	33	48	233	1088	765	419	3
Crawford .....	1365	147	69	167	515	355	110	1
Darkest .....	1871	5	63	181	717	606	291	1
Dearborn .....	1879	20	85	189	675	681	263	1
Decatur .....	1790	15	64	119	605	562	423	12
De Kalb .....	1983	1	37	130	790	706	231	2
Delaware .....	1855	3	67	114	628	609	342	2
Dubois .....	1238		12	73	548	465	140	
Elkhart .....	2459	6	113	191	708	915	535	7
Fayette .....	951		16	26	191	375	341	1
Floyd .....	963	6	72	136	334	263	102	1
Fountain .....	1511		63	108	450	547	368	9
Franklin .....	2225		91	142	712	809	471	
Fulton .....	1429		124	113	460	480	214	
Gibson .....	1610		8	54	147	485	564	354
Grant .....	2412		31	112	210	1034	727	286
Greene .....	1873	123	35	148	675	613	370	7
Hamilton .....	2359	4	86	180	906	800	292	1
Hancock .....	1674	4	51	116	600	689	261	2
Harrison .....	2684	26	140	241	946	969	361	
Hendricks .....	2093	14	82	129	729	732	400	1
Henry .....	2147	1	106	119	578	844	502	1
Howard .....	1325		83	162	662	371	144	1
Huntington .....	2116	13	101	199	864	758	176	2
Jackson .....	2066	2	92	211	751	632	390	6
Jasper .....	832		81	93	271	224	157	5
Jay .....	1919		96	136	800	623	146	1
Jefferson .....	2486		123	200	896	701	412	
Jennings .....	1762		60	132	680	565	308	1
Johnson .....	1706		28	87	575	636	375	3
Knox .....	1824		104	149	625	577	365	4
Kosciusko .....	2477		127	228	973	834	314	1
LaGrange .....	1751	16	79	147	581	592	335	1

## NUMBER AND SIZE OF FARMS—Continued.

COUNTIES	NUMBER OF FARMS.							
	Of all sizes.	Under 3 acres.	3 and under 10.	10 and under 20.	20 and under 50.	50 and under 100.	100 and under 500.	500 and under 1,000.
Lake.....	1350	21	93	102	311	420	345	6
Laporte.....	2118	4	129	211	651	570	495	11
Lawrence.....	1255	1	41	63	339	365	503	19
Madison.....	2288	..	49	175	965	741	356	1
Marion.....	2118	5	170	190	691	828	427	2
Marshall.....	2209	25	208	312	991	516	156	1
Martin.....	1077	..	38	79	429	347	189	2
Miami.....	2028	23	38	127	692	681	235	2
Monroe.....	1506	11	31	119	458	428	365	6
Montgomery.....	2397	19	61	116	584	881	511	5
Morgan.....	1751	7	51	182	591	549	317	9
Newton.....	682	..	9	14	131	227	233	16
Noble.....	2201	8	161	203	696	749	211	12
Ohio.....	500	..	2	15	172	185	125	1
Orange.....	1702	12	62	128	514	468	511	7
Owen.....	1821	..	79	147	532	575	479	8
Parks.....	2041	..	88	174	608	533	624	17
Perry.....	1410	..	152	211	654	311	82	..
Pike.....	1391	12	43	213	708	413	187	2
Porter.....	1580	21	107	148	497	342	326	7
Posey.....	1733	30	28	95	648	589	330	1
Pulaski.....	1102	..	97	130	412	234	196	3
Putnam.....	2035	34	49	118	678	635	545	14
Randolph.....	3009	..	196	210	1248	1051	301	1
Ripley.....	2173	..	93	209	1104	778	268	1
Rush.....	1891	12	14	25	219	689	709	11
Scott.....	966	..	59	115	349	291	138	1
Shelby.....	2112	..	56	149	608	774	41	2
Spencer.....	2281	..	189	325	975	530	233	2
Starke.....	351	..	28	50	162	88	21	2
Steuben.....	1693	11	60	177	715	515	131	..
St. Joseph.....	2103	37	196	218	695	668	350	2
Sullivan.....	2125	..	53	236	818	631	321	0
Switzerland.....	1393	..	108	190	410	421	285	3
Tippecanoe.....	2254	..	211	156	579	652	645	18
Tipton.....	689	2	8	64	424	294	97	..
Union.....	672	..	24	26	101	208	256	..
Vanderburgh.....	1417	1	79	143	668	436	114	1
Vermillion.....	910	..	45	64	212	281	294	0
Vigo.....	2100	..	210	220	711	573	392	1
Wabash.....	2067	1	82	161	118	799	301	..
Warren.....	804	..	30	58	143	210	328	19
Warrick.....	1832	11	39	168	743	617	250	1
Washington.....	2048	..	52	91	517	734	641	6
Wayne.....	1969	11	76	88	464	777	564	6
Wells.....	1912	..	165	208	796	586	157	..
White.....	1663	..	13	47	322	331	327	16
Whitley.....	1601	..	86	144	708	576	148	..

COMPARISON OF THE WEALTH AND TAXATION OF INDIANA, FOR THE YEARS 1870 AND 1860.

	1870.	1860.
Real Estate, assessed value.....	\$460,120,974	\$291,829,992
Personal Estate, assessed value.....	203,334,070	119,212,432
Real and Personal Estate, assessed value.....	663,455,044	411,042,424
Real and Personal Estate, true value.....	1,268,180,503	528,835,371
State Taxation, not national.....	2,943,078	
County Taxation, not national.....	4,654,466	
Town, City, etc., Taxation, not national.....	3,193,577	
Total Taxation, not national.....	10,791,121	3,701,362
Real and Personal Estate, true value for 1850, \$22,650,274.		/

# WEALTH, TAXATION AND PUBLIC INDEBTEDNESS OF THE STATE OF INDIANA, BY COUNTIES.

*Selected from the Ninth Census Report of the United States, 1870.*

COUNTIES	VALUATION					TAXATION, NOT NATIONAL.			PUBLIC DEBT.				
	Assessed value of real estate	Assessed value of personal estate	Total assessed value of real and personal estate	Real and personal estate	State	County	Town, city, etc.	Total.	For which bonds have been issued	All other.	For which bonds have been issued	All other.	Total.
Total.....	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Adams .....	1,677,705	904,015	2,581,720	3,761,720	13,101	55,234	16,280	84,615	.....	.....	.....	.....	.....
Allen .....	9,930,000	3,139,500	13,069,500	20,199,500	68,085	132,893	281,303	374,851	.....	45,000	4,600	.....	46,000
Bartholomew .....	6,217,655	3,282,645	9,499,300	12,681,645	41,259	35,086	48,453	125,298	.....	.....	27,500	.....	.....
Benton .....	2,537,546	740,649	3,278,195	8,091,800	14,273	20,985	14,964	50,232	.....	.....	.....	.....	.....
Blackford .....	904,680	365,950	1,270,630	4,270,000	6,719	16,882	9,964	33,315	.....	.....	25,000	.....	.....
Boone .....	6,521,600	2,789,700	9,311,300	18,000,000	38,003	22,003	32,100	82,774	.....	.....	.....	.....	.....
Brown .....	808,705	428,484	1,237,189	2,000,000	6,712	15,015	7,743	29,470	.....	.....	.....	.....	.....
Carroll .....	4,000,000	2,410,850	6,410,850	14,000,000	74,614	41,732	28,924	146,170	.....	.....	.....	.....	.....
Cass .....	6,857,510	2,801,676	9,659,186	20,000,000	42,750	42,892	37,942	123,884	.....	.....	.....	.....	.....
Clarke .....	7,208,000	2,400,500	9,608,500	20,000,000	43,370	46,140	91,285	179,895	.....	.....	.....	.....	.....
Clay .....	3,700,000	1,416,670	5,116,670	12,000,000	21,367	26,932	21,300	69,760	.....	.....	.....	.....	.....
Clinton .....	4,018,446	2,029,616	6,048,062	16,000,000	33,826	79,774	24,132	138,229	.....	.....	.....	.....	.....
Crawford .....	1,000,000	600,000	1,600,000	3,000,000	8,313	16,933	9,847	27,812	.....	.....	.....	.....	.....



## WEALTH, TAXATION AND PUBLIC INDEBTEDNESS—Continued.

COUNTIES.	VALUATION.				TAXATION, NOT NATIONAL.				PUBLIC DEBT.			
	Assessed value of real estate.	Assessed value of personal estate.	Total assessed value of real and personal estate.	True valuation of real and personal estate.	State.	County.	Town, city, etc.	Total.	COUNTY.		TOWN, CITY, ETC.	
									For which bonds have been issued.	All other.	For which bonds have been issued.	All other.
Ohio	1,252,000	437,243	1,689,243	2,508,320	7,839	20,889	5,581	34,289	Dollars.	Dollars.	Dollars.	Dollars.
Orange	8,124,010	1,704,211	9,828,221	10,000,000	21,950	20,293	18,491	60,737	10,500	610		
Owen	2,900,480	1,021,370	3,921,850	5,228,375	25,143	33,788	18,040	76,901	10,000		For which bonds have been issued.	All other.
Park	6,796,615	3,115,318	9,911,933	15,746,300	43,848	42,513	46,731	133,160				
Perry	1,284,795	1,038,890	2,323,685	5,000,000	14,725	20,817	16,800	60,432	21,838			
Pike	2,109,339	1,164,901	3,274,240	5,000,000	16,278	31,533	16,713	64,414	4,800	8,200		
Porter	3,031,935	1,318,270	4,350,205	14,828,815	24,787	38,992	37,849	101,628			30,000	2,000
Poway	5,438,235	2,566,320	8,004,555	9,451,030	30,044	26,964	29,970	89,904			10,000	
Pulaski	1,337,360	673,825	2,011,185	2,500,000	9,467	14,986	12,125	36,778	4,516		8,000	
Putnam	9,349,940	2,902,275	12,252,215	16,810,000	83,958	57,235	41,948	163,201				
Randolph	5,843,400	2,219,325	8,062,725	13,411,205	37,418	30,473	54,112	121,903				
Ripley	2,703,850	1,170,225	3,874,075	8,000,000	15,354	46,169	2,313	63,836	2,000	7,300		
Rush	8,674,925	3,611,555	12,286,480	15,000,000	52,740	20,790	48,718	122,257		6,000	15,700	
Scott	1,172,130	530,730	1,702,860	3,400,000	7,161	8,000	8,015	21,317	5,000			
Shelby	2,325,800	2,447,375	4,773,175	25,700,275	47,554	148,560	9,158	265,274		2,380		12,267
Spencer	3,358,675	1,542,400	4,901,075	12,000,000	24,400	44,000	28,700	97,100		60,000		
Stark	787,434	166,470	953,904	1,200,000	5,150	11,500	7,000	24,100		9,000		
Steuben	2,283,140	701,768	2,984,908	9,300,000	14,136	92,673	23,420	167,500		1,600		
St. Joseph	0,096,340	3,810,345	4,906,685	20,100,000	46,846	58,172	42,030	127,016	21,000		70,000	
Sullivan	4,009,185	1,860,815	5,870,000	8,000,000	27,692	25,706	19,561	74,959				
Switzerland	2,637,725	1,016,280	3,654,005	10,940,015	17,163	31,337	18,241	66,761	10,000			
Tippecanoe	19,619,690	8,238,325	27,858,015	47,000,000	91,813	200,000	66,605	358,011				
Tipton	8,187,718	704,708	8,892,426	4,000,000	12,613	27,198	14,738	54,538	10,000	7,500		



Union	2,035,000	1,520,220	4,555,220	10,942,570	21,170	20,716	90,027	81,443	205,000	18,000	759,810	54,859
Vanderburgh	8,870,465	4,868,675	13,739,140	40,000,000	11,100	227,880	163,978	452,410	000,000	10,000	759,810	54,859
Vermillion	8,103,000	1,632,000	4,465,000	10,000,000	21,323	70,435	13,853	114,621	000,000	10,000	759,810	54,859
Vigo	16,000,000	7,000,000	22,000,000	50,000,000	71,300	46,000	55,977	213,977	000,000	10,000	759,810	54,859
Wabash	8,907,000	2,100,000	6,107,000	14,100,000	58,342	42,122	58,331	116,786	000,000	10,000	759,810	54,859
Warren	4,444,300	1,966,000	6,410,300	10,000,000	25,282	35,257	40,000	101,539	000,000	10,000	759,810	54,859
Warwick	3,304,446	1,750,000	5,144,446	8,000,000	23,920	70,414	50,214	132,718	000,000	10,000	759,810	54,859
Washington	6,083,045	2,131,302	7,213,347	15,000,000	12,401	20,008	4,705	37,774	000,000	10,000	759,810	54,859
Wayne	12,424,210	7,807,200	20,231,410	35,000,000	80,474	140,808	10,705	246,847	32,400	210,000	759,810	54,859
Wells	2,046,135	672,786	2,718,920	6,000,000	73,440	40,392	10,911	81,021	42,000	4,000	759,810	54,859
White	8,053,225	968,340	4,351,635	5,314,545	10,211	33,406	21,880	74,506	000,000	10,000	759,810	54,859
Whitley	3,021,434	1,060,706	4,110,200	12,000,000	19,761	25,431	32,628	67,720	000,000	10,000	759,810	54,859
Not distributed among counties					180,020			160,020				

The total receipts into the State Treasury during the fiscal year were \$1,589,889; of which \$2,001,579 were from taxes; \$90,688 from interest on school and sinking fund; \$65,900 from liquor licenses; \$16,626 from college fund; \$140,870 from public institutions; \$4,677 from militia fund, and \$18,648 from miscellaneous sources.

The total disbursements from the State Treasury were \$153,2,537, of which, \$26,198 were for the executive department; \$5,890 were for legislative expenses; \$73,119 for the judiciary, \$125,200 for penitentiary expenses, \$62,566 for house of refuge; \$36,050 for female prison, \$137,155 for hospital for leprosy, \$4,042 for deaf and dumb asylum; \$35,604 for soldiers' home; \$1,580,703 for educational purposes and schools; \$11,881 for public printing; \$1,108,778 for interest and redemption of public debt; \$4,428 for military expenses; and \$213,344 for repayments and miscellaneous and contingent expenses.

The statement of funded debt is exclusive of internal improvement bonds to the amount of \$191,000, for the redemption of which the Governor deems it probable the State may be obliged to make provision, and inclusive of bonds to the amount of \$1,734,268 held by educational funds.

# POPULATION OF THE STATE OF INDIANA BY COUNTIES—1790-1870.

Selected from the Ninth Census of the United States, 1870,

COUNTIES.	AGGREGATE.								
	1870	1860	1850	1840	1830	1820	1810	1800	1790
<b>Total.....</b>	<b>1580637</b>	<b>1350428</b>	<b>988416</b>	<b>685846</b>	<b>343081</b>	<b>147178</b>	<b>24520</b>	5766 683124 2517	
Adams.....	11382	9252	5797	2261					
Allen.....	43494	28328	16911	5942	1016				
Bartholomew..	21153	17005	12438	1220	5476				
Benton.....	5615	2809	1144						
Blackford.....	6272	4122	2863	10043					
Boone.....	22603	16756	11001	8121	621				
Brown.....	8681	6507	4846	2304					
Carroll.....	16152	13489	11010	7819	1611				
Cass.....	24193	16843	11921	5480	1262				
Clarke.....	24779	20502	14828	1405	10086	8700	5670		
Clay.....	13084	12161	7944	567	1616				
Clinton.....	17330	14505	11800	7508	1423				
Crawford.....	3801	822	624	5282	3218	2583			
Daviess.....	16747	13323	10002	6420	4541	3432			
Dearborn.....	24116	24400	20166	16627	13974	11468	711		
Decatur.....	19053	17204	15107	12171	8887				
De Kalb.....	17107	13880	8751	1908					
Delaware.....	19000	15753	10811	8443	2374	3677			
Dubois.....	12597	10304	6321	4032	1778	1168			
Elkhart.....	26026	26086	12000	6000	535				
Fayette.....	10476	10225	10217	9817	8112	5050			
Floyd.....	23100	20183	14875	9454	6301	2776			
Fountain.....	16080	15560	12000	11918	7619				
Franklin.....	20223	19540	17908	13349	10190	10763			
Fulton.....	12726	9472	5082	1903					
Gibson.....	17371	14562	10771	5977	5418	3876			
Grant.....	18487	16797	11092	4875					
Greene.....	19514	16041	12313	8321	4242				
Hamilton.....	20682	17510	12084	9855	1757				
Hancock.....	15123	12902	9008	7535	1436				
Harrison.....	10913	18521	12080	12450	10273	7875	3095		
Hendricks.....	20277	16953	14081	11264	3075				
Henry.....	22886	20118	17005	15128	6397				
Howard.....	15847	12524	6057						
Huntington.....	19036	14807	7859	1579					
Jackson.....	18974	16286	11047	8961	4870	4010			
Jasper.....	6004	4291	3540	1267					
Jay.....	15000	11300	7047	3903					
Jefferson.....	29741	25038	20916	16014	11465	8038			
Jennings.....	16218	14740	12096	8829	3974	2000			
Johnson.....	18366	14854	12101	9352	4019				
Knox.....	21602	16056	11084	10057	6525	5437	7945	2517	
Kosciusko.....	25531	17418	10243	4170					
Lagrange.....	14148	11366	8087	3904					
Lake.....	12339	9145	3991	1408					
Laporte.....	27062	22819	12145	8184					

## POPULATION OF INDIANA—Continued.

COUNTIES.	AGGREGATE.								
	1870	1860	1850	1840	1830	1820	1810	1800	1790.
Lawrence.....	14628	13692	12097	11782	9234	4116	.....	.....	.....
Madison.....	22770	16518	12375	8874	2238	.....	.....	.....	.....
Marion.....	71939	39855	24103	16080	7192	.....	.....	.....	.....
Marshall.....	20211	12722	5348	1651	.....	.....	.....	.....	.....
Martin.....	11103	8975	5941	3875	2010	1082	.....	.....	.....
Miami.....	21052	16851	11304	3648	.....	.....	.....	.....	.....
Monroe.....	14168	12847	11286	10143	6577	2679	.....	.....	.....
Montgomery. ...	23765	20888	18084	14438	7317	.....	.....	.....	.....
Morgan.....	17528	16110	14576	10741	5593	.....	.....	.....	.....
Newton.....	5829	2360	.....	.....	.....	.....	.....	.....	.....
Noble.....	20389	14915	7946	2702	.....	.....	.....	.....	.....
Ohio.....	5837	5462	5308	.....	.....	.....	.....	.....	.....
Orange.....	13497	12076	10809	9602	7901	5368	.....	.....	.....
Owen.....	16137	14376	12106	8359	4017	838	.....	.....	.....
Parke.....	18166	15538	14968	13499	7535	.....	.....	.....	.....
Perry.....	14801	11847	7268	4655	3369	2330	.....	.....	.....
Pike.....	13779	10078	7720	4769	2475	1472	.....	.....	.....
Porter.....	13942	10313	5234	2162	.....	.....	.....	.....	.....
Posey.....	19185	16167	12549	9683	6549	4061	.....	.....	.....
Pulaski.....	7801	5711	2595	561	.....	.....	.....	.....	.....
Putnam.....	21514	20681	18615	13843	8262	.....	.....	.....	.....
Randolph.....	22862	18997	14725	10684	3912	1808	.....	a1103	.....
Ripley.....	20977	19054	14820	10392	3989	1822	.....	.....	.....
Rush.....	17626	16193	16445	16456	9707	.....	.....	.....	.....
Scott.....	7873	7303	5885	4242	3092	2334	.....	.....	.....
Shelby.....	21892	19569	15502	12005	6295	.....	.....	.....	.....
Spencer.....	17998	14556	8616	6305	3196	1882	.....	.....	.....
Starke.....	3888	2195	557	149	.....	.....	.....	.....	.....
St. Clair.....	.....	.....	.....	.....	.....	.....	.....	a1255	.....
Steuben.....	12854	10374	6104	2578	.....	.....	.....	.....	.....
St. Joseph.....	25322	18455	10954	6425	287	.....	.....	.....	.....
Sullivan.....	18453	15064	10141	8315	4630	3498	.....	.....	.....
Switzerland.....	12134	12598	12932	9920	7028	3934	.....	.....	.....
Tippecanoe.....	33515	25726	19377	13724	7187	.....	.....	.....	.....
Tipton.....	11953	8170	3532	.....	.....	.....	.....	.....	.....
Union.....	6341	7109	6944	8017	7944	.....	.....	.....	.....
Vanderburgh....	33145	20552	11414	6250	2611	1798	.....	.....	.....
Vermillion.....	10840	9422	8661	8274	5652	.....	.....	.....	.....
Vigo.....	33549	22517	15289	12076	5766	3390	.....	.....	.....
Wabash.....	21305	17547	12138	2756	.....	147	.....	.....	.....
Warren.....	10204	10057	7387	5856	2861	.....	.....	.....	.....
Warrick.....	17653	13261	8811	6321	2877	1749	.....	.....	.....
Washington ...	18495	17909	17040	15269	13064	9039	.....	.....	.....
Wayne.....	34048	29558	25320	23290	18571	12119	.....	.....	.....
Wells.....	13585	10844	6152	1822	.....	.....	.....	.....	.....
White.....	10554	8258	4761	1832	.....	.....	.....	.....	.....
Whitley.....	14399	10730	5190	1237	.....	.....	.....	.....	.....

## POPULATION OF INDIANA—Continued.

COUNTIES.	WHITE.								
	1870	1880	1890	1900	1910	1920	1930	1940	1950
Total.....	1655837	1338710	977154	678698	333399	145758	23890	6760 ab2941 2402	.....
Adams.....	11382	9246	5789	2247	.....	.....	.....	.....	.....
Allen.....	43428	29243	16817	5924	992	.....	.....	.....	.....
Bartholomew...	21122	17858	12346	1213	5470	.....	.....	.....	.....
Benton.....	5615	2809	1144	.....	.....	.....	.....	.....	.....
Blackford.....	6258	4122	2849	10008	.....	.....	.....	.....	.....
Boone.....	22353	16463	11611	8102	619	.....	.....	.....	.....
Brown.....	8680	6503	4827	2341	.....	.....	.....	.....	.....
Carroll.....	16128	13476	10082	7813	1611	.....	.....	.....	.....
Cass.....	24082	16770	10930	5440	1146	.....	.....	.....	.....
Clarke.....	22800	18982	15243	14207	10443	8571	5549	.....	.....
Clay.....	19054	12139	7923	5584	1615	.....	.....	.....	.....
Clinton.....	17323	14485	11845	7419	1422	.....	.....	.....	.....
Crawford.....	9848	8226	6523	5270	3238	2583	.....	.....	.....
Daviess.....	16618	13249	10308	6695	4499	3400	.....	.....	.....
Dearborn.....	24058	24332	20019	19192	13912	11396	7218	.....	.....
Decatur.....	18966	17275	14351	12108	5877	.....	.....	.....	.....
De Kalb.....	17163	13867	8241	1961	.....	.....	.....	.....	.....
Delaware.....	18976	15732	10839	8840	2372	3674	.....	.....	.....
Dubois.....	12562	10383	6300	3625	1776	1160	.....	.....	.....
Elkhart.....	25301	20968	12674	6658	935	.....	.....	.....	.....
Fayette.....	10384	10130	10145	9781	9081	5341	.....	.....	.....
Floyd.....	21836	19426	14301	9052	6006	2707	.....	.....	.....
Fountain.....	16342	15593	13201	11185	7610	.....	.....	.....	.....
Franklin.....	20199	19446	17759	13277	10099	10698	.....	.....	.....
Fulton.....	12710	9416	5980	1992	.....	.....	.....	.....	.....
Gibson.....	16934	14258	10554	8840	5315	3801	.....	.....	.....
Grant.....	17750	15412	10945	4875	.....	.....	.....	.....	.....
Greene.....	19493	15962	12238	8239	4201	.....	.....	.....	.....
Hamilton.....	20367	16960	12502	9788	1758	.....	.....	.....	.....
Hancock.....	15039	12709	9594	7496	1436	.....	.....	.....	.....
Harrison.....	19564	18407	15195	12370	10150	7806	3562	.....	.....
Hendricks.....	20095	16908	14047	11247	3470	.....	.....	.....	.....
Henry.....	22545	19836	17318	14983	6456	.....	.....	.....	.....
Howard.....	15543	12359	6552	.....	.....	.....	.....	.....	.....
Huntington.....	19028	14895	7647	1515	.....	.....	.....	.....	.....
Jackson.....	18810	16107	10833	8771	4750	3974	.....	.....	.....
Jasper.....	6361	4286	3539	1265	.....	.....	.....	.....	.....
Jay.....	14979	11378	7017	3852	.....	.....	.....	.....	.....
Jefferson.....	28636	24524	23348	16185	11225	7926	.....	.....	.....
Jennings.....	15796	11538	11773	8671	3916	1955	.....	.....	.....
Johnson.....	18251	14835	12086	9332	4013	.....	.....	.....	.....
Knox.....	21182	15607	10554	10006	6078	5153	7561	2402	.....
Kosciusko.....	23521	17416	10242	4170	.....	.....	.....	.....	.....
Lagrange.....	14123	11350	8369	3661	.....	.....	.....	.....	.....
Lake.....	12336	9140	3990	1466	.....	.....	.....	.....	.....
Laporte.....	26834	22781	12057	8152	.....	.....	.....	.....	.....
Lawrence.....	14378	13574	12003	11676	9175	4101	.....	.....	.....
Madison.....	22682	16458	12311	8868	2227	.....	.....	.....	.....
Marion.....	67997	39030	23453	15825	7119	.....	.....	.....	.....
Marshall.....	20211	12719	8346	1650	.....	.....	.....	.....	.....
Martin.....	11067	8923	5845	3852	1999	1028	.....	.....	.....
Miami.....	20856	16631	11293	3044	.....	.....	.....	.....	.....
Monroe.....	13909	12822	11259	10130	6507	2671	.....	.....	.....
Montgomery.....	23598	20738	17941	14344	7308	.....	.....	.....	.....
Morgan.....	17454	16003	14501	10651	5562	.....	.....	.....	.....
Newton.....	6793	2360	.....	.....	.....	.....	.....	.....	.....
Noble.....	20376	14907	7940	2702	.....	.....	.....	.....	.....
Ohio.....	5648	5439	5271	.....	.....	.....	.....	.....	.....
Orange.....	13338	11816	10558	9444	7776	5272	.....	.....	.....
Owen.....	16078	14291	11950	8211	3992	827	.....	.....	.....
Parke.....	18014	16312	14740	13436	7519	.....	.....	.....	.....

POPULATION OF INDIANA—Continued.

COUNTIES.	WHITE.								
	1870	1860	1850	1840	1830	1820	1810	1800	1790
Perry.....	14651	11844	7259	4651	3356	2314	.....	.....	.....
Pike.....	13765	10064	7710	4749	2461	1465	.....	.....	.....
Porter.....	13903	10293	5229	2155	.....	.....	.....	.....	.....
Posey.....	18621	16031	12451	9842	6523	4044	.....	.....	.....
Pulaski.....	7801	5711	2595	561	.....	.....	.....	.....	.....
Putnam.....	21409	20062	18581	16815	8256	.....	.....	.....	.....
Randolph.....	22245	18172	14053	10180	3789	1803	.....	9962	.....
Ripley.....	20874	18967	14724	10349	3981	1820	.....	.....	.....
Rush.....	17162	15774	16018	15973	9600	.....	.....	.....	.....
Scott.....	7868	7301	5870	4227	3077	2338	.....	.....	.....
Shelby.....	21764	19548	15483	11985	6287	.....	.....	.....	.....
Spencer.....	17049	14554	8602	6278	3182	1877	.....	.....	.....
Starke.....	3888	2194	557	149	.....	.....	.....	.....	.....
St. Clair.....	.....	.....	.....	.....	.....	.....	.....	1213	.....
Stonewall.....	12849	10372	6103	2578	.....	.....	.....	.....	.....
St. Joseph.....	25195	18338	10955	6416	287	.....	.....	.....	.....
Sullivan.....	18348	14944	10103	8289	4591	3470	.....	.....	.....
Switzerland.....	12013	12656	12866	9878	7015	3925	.....	.....	.....
Tippecanoe.....	33343	25582	19216	13670	7187	.....	.....	.....	.....
Tipton.....	11892	8135	3525	.....	.....	.....	.....	.....	.....
Union.....	6229	7063	6906	7956	7867	.....	.....	.....	.....
Vanderburgh.....	30944	20425	11187	6136	2563	1787	.....	.....	.....
Vermillion.....	10792	9392	8643	8251	5673	.....	.....	.....	.....
Vigo.....	32447	21811	14541	11651	5643	3364	.....	.....	.....
Wabash.....	21174	17469	12124	2746	.....	142	.....	.....	.....
Warren.....	10181	10040	7378	5556	2861	.....	.....	.....	.....
Warrick.....	17166	13242	8782	6313	2875	1742	.....	.....	.....
Washington.....	18477	17722	16788	15076	12858	8980	.....	.....	.....
Wayne.....	32810	28688	24284	22664	18154	12053	.....	.....	.....
Wells.....	13585	10843	6141	1809	.....	.....	.....	.....	.....
White.....	10551	8237	4752	1830	.....	.....	.....	.....	.....
Whitley.....	14302	10637	5095	1221	.....	.....	.....	.....	.....

(a) These counties now parts of the State of Illinois.  
(b) Then in Indiana Territory, but now in parts in Illinois, Michigan and Wisconsin.

## POPULATION OF INDIANA—Continued.

COUNTIES.	COLORED.								
	1870	1860	1850	1840	1830	1820	1810	1800	1790
Total.....	24560	11428	11262	7165	3629	1230	393	476 87	
Adams .....		6	8	17					
Allen.....	42	63	102	18	4				
Bartholomew ..	11	7	82	13	6				
Benton .....									
Blackford .....	14		11	34					
Boone .....	240	90	20	19	2				
Brown .....	1		19	23					
Carroll .....	24	13	33	6					
Cass.....	111	65	61	40	16				
Clarke .....	1970	520	582	388	243	138	40		
Clay .....	26	22	18	3	1				
Clinton .....	7	20	24	9	1				
Crawford .....	3		1	12					
Daviess.....	129	74	44	25	44	32			
Dearborn.....	58	74	147	135	62	72	92		
Decatur .....	87	24	156	63	9				
De Kalb .....	4	15	10	7					
Delaware.....	53	16	4	3	2	3			
Dubois .....	35	12	21	7	2	8			
Elkhart .....	35	20	16	2					
Fayette .....	92	87	72	53	31	9			
Floyd .....	1402	757	574	402	265	69			
Fountain .....	47	73	52	33	9				
Franklin .....	24	103	209	82	91	65			
Fulton .....	16	6	2	1					
Gibson .....	437	274	217	137	53	45			
Grant .....	737	384	147						
Greene .....	21	79	75	82	41				
Hamilton .....	515	350	182	67	1				
Hancock .....	54	93	104	39					
Harrison .....	349	114	91	89	123	69	12		
Hendricks.....	182	45	36	17	5				
Henry .....	441	283	287	145	41				
Howard .....	304	165	106						
Huntington .....	5	2	3	14					
Jackson .....	164	179	214	190	120	36			
Jasper .....	3	5	1	2					
Jay .....	21	21	30	11					
Jefferson .....	1105	512	568	429	240	112			
Jennings .....	422	151	323	158	58	45			
Johnson .....	115	19	15	20	6				
Knox .....	380	449	530	561	447	166	249	87	
Kosciusko.....	10	2	1						
Lagrange .....	25	16	18	3					
Lake .....	3	5	1	2					
Laporte .....	228	135	78	32					
Lawrence .....	210	118	94	106	59	15			
Madison .....	88	60	14	0	11				
Marion.....	3938	825	650	255	73				
Marshall .....		3	2	1					
Martin .....	36	52	96	23	11	4			
Miami .....	51	47	11	4					
Monroe.....	259	25	27	13	70	8			
Montgomery ..	167	150	143	94	9				
Morgan .....	74	167	75	90	31				
Newton .....	33								
Noble .....	13	8	6						
Ohio.....	189	23	37						
Orange .....	159	260	251	158	124	96			
Owen .....	59	85	156	148	25	10			
Parke .....	152	196	228	63	16				
Perry .....	150	3	9	4	13	15			

## POPULATION OF INDIANA—Continued.

COUNTIES.	COLORED.								
	1870	1860	1850	1840	1830	1820	1810	1800	1790
Pike.....	14	14	10	20	14	4	.....	.....	.....
Porter.....	39	17	5	7	.....	.....	.....	.....	.....
Posey.....	564	126	98	41	26	6	.....	.....	.....
Pulaski.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Putnam.....	105	19	34	27	6	.....	.....	.....	.....
Randolph.....	617	825	662	504	123	5	.....	a34	.....
Ripley.....	103	87	96	43	8	2	.....	.....	.....
Rush.....	463	419	427	481	107	.....	.....	.....	.....
Scott.....	5	2	15	15	15	.....	.....	.....	.....
Shelby.....	128	21	19	20	8	.....	.....	.....	.....
Spencer.....	949	2	14	27	14	2	.....	.....	.....
Starke.....	.....	1	.....	.....	.....	.....	.....	.....	.....
St. Clair.....	.....	.....	.....	.....	.....	.....	.....	a42	.....
Steuben.....	5	2	2	.....	.....	.....	.....	.....	.....
St. Joseph.....	120	88	29	9	.....	.....	.....	.....	.....
Sullivan.....	105	120	38	26	39	20	.....	.....	.....
Switzerland..	121	42	66	42	13	9	.....	.....	.....
Tippecanoe.....	172	143	161	54	.....	.....	.....	.....	.....
Tipton.....	61	35	7	.....	.....	.....	.....	.....	.....
Union.....	112	40	38	61	77	.....	.....	.....	.....
Vanderburgh...	2151	127	227	114	48	3	.....	.....	.....
Vermillion.....	48	30	18	23	19	.....	.....	.....	.....
Vigo.....	1099	706	748	425	123	26	.....	.....	.....
Wabash.....	84	33	14	10	.....	5	.....	.....	.....
Warren.....	22	17	9	.....	.....	.....	.....	.....	.....
Warrick.....	487	19	29	8	1	6	.....	.....	.....
Washington....	18	187	252	193	206	59	.....	.....	.....
Wayne.....	1238	870	1036	626	417	66	.....	.....	.....
Wells.....	.....	1	11	13	.....	.....	.....	.....	.....
White.....	3	21	9	2	.....	.....	.....	.....	.....
Whitley.....	97	92	95	16	.....	.....	.....	.....	.....
	INDIAN.								
	1870	1860	1850	1840	1830	1820	1810	1800	1790
Total.....	240	290	.....	.....	.....	.....	.....	.....	.....
Allen.....	24	22	.....	.....	.....	.....	.....	.....	.....
Brown.....	.....	4	.....	.....	.....	.....	.....	.....	.....
Cass.....	.....	8	.....	.....	.....	.....	.....	.....	.....
Clay.....	4	.....	.....	.....	.....	.....	.....	.....	.....
Delaware.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Grant.....	.....	1	.....	.....	.....	.....	.....	.....	.....
Huntington...	3	.....	.....	.....	.....	.....	.....	.....	.....
Marion.....	4	.....	.....	.....	.....	.....	.....	.....	.....
Miami.....	145	173	.....	.....	.....	.....	.....	.....	.....
Rush.....	1	.....	.....	.....	.....	.....	.....	.....	.....
St. Joseph.....	7	29	.....	.....	.....	.....	.....	.....	.....
Tippecanoe.....	.....	1	.....	.....	.....	.....	.....	.....	.....
Union.....	.....	6	.....	.....	.....	.....	.....	.....	.....
Vigo.....	3	.....	.....	.....	.....	.....	.....	.....	.....
Wabash.....	47	45	.....	.....	.....	.....	.....	.....	.....
Warren.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Whitley.....	.....	1	.....	.....	.....	.....	.....	.....	.....

(a) These counties now parts of the State of Illinois.

(b) Then in Indiana Territory, but now in parts in Illinois, Michigan and Wisconsin.

**ESTIMATE**  
**OF THE**  
**PRINCIPAL AGRICULTURAL PRODUCTS,**  
**OF**  
**INDIANA, FOR 1871.**

**SELECTED FROM THE REPORT OF THE DEPARTMENT OF  
AGRICULTURE, FOR THAT YEAR.**

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The crop estimates of the Department of Agriculture are based upon monthly statements made by persons who act as correspondents to the Department from the several counties. The yield per acre being given definitely in bushels, pounds or tons. Their prices in dollars and cents.

This system of approximating the yield and value is probably as nearly correct as any method that could be devised, to get the returns within the year in which the crops are grown.

As the report for 1871 was not received in time for insertion in the report of this Board for that year, it is deemed proper to insert it here.



AGGREGATE YIELD AND VALUE FOR 1870.

	Bushels.	Acres.	Value of Crop.
Indian corn.....	79,205,000	2,218,627	\$29,305,850
Wheat.....	19,190,000	1,599,166	24,170,400
Rye.....	423,000	30,321	304,560
Oats.....	11,784,000	409,166	3,888,720
Barley.....	352,000	12,848	253,440
Buckwheat.....	154,000	11,407	116,500
Potatoes.....	2,436,000	38,062	1,997,520
Tobacco, pounds.....	8,316,000	11,846	706,860
Hay, tons.....	826,000	694,117	10,556,280

AVERAGE YIELD PER ACRE AND PRICE FOR 1871.

	Bushels.	Price.	Value per Acre.
Corn.....	35. 7	37	\$13 20
Wheat.....	12. 0	\$1 26	15 12
Rye.....	13. 9	72	10 00
Oats.....	28. 8	33	9 50
Barley.....	24. 4	72	19 72
Buckwheat.....	13. 5	75	10 12
Potatoes.....	64. 0	82	52 48
Tobacco, pounds.....	70. 2	8-5	59 67
Hay, tons.....	1.19	12 78	15 20
Total average cash value per acre.....			\$14 18

FEBRUARY, 1872.

	Numbers.	Average Price.	Total Value.
Horses.....	863,000	\$36 78	\$44,275,140
Mules.....	35,300	68 66	2,423,698
Oxen and other cattle.....	750,000	23 26	16,695,000
Milch cows.....	444,200	33 57	14,911,794
Sheep.....	1,953,000	2 54	4,960,620
Hogs.....	2,489,900	4 91	12,275,297

## TABULAR STATEMENT

*Showing the Number of Pounds per Bushel required, by law or custom, in the sale of articles specified, in the several States of the Union.*

STATES.	Apples, dried.	Barley.	Beans, white.	Buckwheat.	Corn, ear.	Corn, shelled.	Corn meal.	Oats.	Peaches, dried.	Potatoes, Irish.	Rye.
Maine .....	.....	48	64	48	.....	56	50	30	.....	60	.....
New Hampshire .....	.....	.....	60	.....	.....	56	50	30	.....	60	56
Vermont .....	.....	48	64	48	.....	.....	.....	32	.....	60	56
Massachusetts .....	.....	48	.....	48	.....	56	50	32	.....	60	56
Connecticut .....	.....	.....	.....	45	.....	56	.....	28	.....	60	56
New York .....	.....	48	62	48	.....	58	.....	32	.....	60	56
New Jersey .....	.....	48	.....	50	.....	56	.....	30	.....	60	56
Pennsylvania .....	.....	47	.....	48	.....	56	.....	30	.....	56	56
Delaware .....	.....	.....	.....	.....	.....	56	.....	.....	.....	.....	.....
Maryland .....	28	48	62	48	70	56	.....	32	.....	60	56
District of Columbia .....	24	47	62	48	70	56	48	32	38	56	56
Virginia .....	.....	48	60	48	70	56	50	32	.....	60	56
West Virginia .....	25	48	60	52	.....	56	48	32	33	60	56
North Carolina .....	.....	48	.....	50	.....	54	46	30	.....	.....	56
South Carolina .....	26	48	60	56	70	56	50	33	33	60	56
Georgia .....	25	40	.....	.....	.....	56	48	35	.....	56	.....
Arkansas .....	24	48	60	52	70	56	50	32	33	60	56
Tennessee .....	26	48	60	50	70	56	50	32	.....	60	56
Kentucky .....	.....	48	60	52	.....	56	50	33 $\frac{1}{8}$	.....	56	56
Ohio .....	25	48	60	50	70	56	.....	32	33	60	56
Michigan .....	22	48	60	48	70	56	.....	32	28	60	56
Indiana .....	25	48	60	50	68	56	50	32	33	60	56
Illinois .....	24	48	60	52	70	56	48	32	33	60	56
Wisconsin .....	28	48	.....	50	.....	56	.....	32	28	60	56
Minnesota .....	28	48	.....	42	.....	56	.....	32	28	60	56
Iowa .....	24	48	60	52	.....	56	.....	33	33	60	56
Missouri .....	24	48	60	52	.....	56	.....	32	33	60	56
Kansas .....	24	50	60	50	70	56	50	32	.....	60	56
Nebraska .....	24	48	60	52	70	56	50	34	33	60	56
California .....	.....	50	.....	10	.....	52	.....	32	.....	.....	54
Oregon .....	28	46	.....	42	.....	56	.....	36	28	60	56

## TABULAR STATEMENT—Continued.

STATES.	SEEDS.									Wheat.
	Blue grass.	Clover.	Flax.	Hemp.	Hungarian.	Millet.	Osage orange.	Sorghum.	Timothy.	
Maine.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	80
New Hampshire.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	80
Vermont.....	.....	60	.....	.....	.....	.....	.....	.....	42	80
Massachusetts.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	80
Connecticut.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	58
New York.....	.....	60	55	.....	.....	.....	.....	.....	44	80
New Jersey.....	.....	64	55	.....	.....	.....	.....	.....	.....	80
Pennsylvania.....	.....	62	.....	.....	.....	.....	.....	.....	.....	80
Delaware.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	80
Maryland.....	14	64	56	44	48	50	37	37	45	60
District of Columbia.....	12	60	56	44	.....	.....	.....	.....	45	55
Virginia.....	.....	64	56	44	.....	.....	.....	.....	45	56
West Virginia.....	.....	60	56	.....	.....	.....	.....	.....	45	60
North Carolina.....	.....	64	55	.....	.....	.....	.....	.....	.....	60
South Carolina.....	14	60	56	44	60	50	.....	.....	.....	60
Georgia.....	.....	80	56	.....	.....	.....	.....	.....	45	60
Arkansas.....	14	60	56	44	48	50	36	42	45	60
Tennessee.....	14	.....	56	.....	48	50	33	42	45	60
Kentucky.....	14	66	56	44	.....	.....	.....	.....	45	60
Ohio.....	.....	60	56	44	50	50	.....	.....	45	60
Michigan.....	14	60	56	44	50	50	33	.....	45	58
Indiana.....	14	60	56	44	.....	.....	.....	.....	.....	60
Illinois.....	14	60	56	44	.....	.....	.....	.....	.....	60
Wisconsin.....	.....	60	56	.....	.....	.....	.....	.....	.....	60
Minnesota.....	.....	60	.....	.....	.....	.....	.....	.....	.....	60
Iowa.....	14	60	56	44	45	45	32	30	45	60
Missouri.....	14	60	56	44	.....	.....	.....	.....	45	60
Kansas.....	14	.....	56	44	55	55	.....	.....	45	55
Nebraska.....	14	60	56	44	60	85	82	30	45	55
California.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	60
Oregon.....	.....	60	.....	.....	.....	.....	.....	.....	.....	60



# PROTECTION AGAINST DROUTH.

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BY HON. ISAAC KINLEY.

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The subject under consideration is greatly too large for a single short paper; greatly too deep for one who has not given his life to its study; and yet too important to be disregarded, even though one can afford but snatches of time for its investigation.

It is now an admitted fact, that a drouth, of greater or less severity, is an event of almost annual occurrence. It is often very extensive, sometimes extending throughout all the territory east of the Rocky Mountains and the Canadas, causing a diminution of crops, and consequent losses counted by millions.

Is there a remedy? And if so, what? The tendency to rain depends on causes, which, in the present state of human knowledge, are not within man's control.

It is not so true now as when first uttered that "The wind bloweth where it listeth, and we hear the sound thereof, but we know not whence it cometh, or whither it goeth." It is now known that the winds have regular currents, and science is able to predict, with considerable accuracy, the coming weather.

But the weather depends upon the direction of the wind. A steady wind from the Gulf, of forty-eight hours duration, usually produces rain. A steady wind from the north, of like duration, would produce frost in July.

The subject of the wind currents, with the laws governing them, is a very interesting one, but with the present state

of human knowledge, we are not able to change them. We know they are governed by law, but this law we have no power to control.

The continent is formed with its mountains and valleys, its internal lakes and adjacent oceans. These modify the wind currents and rainfall. The condition of the weather, at any given time, whether cold or hot, raining or fair, is as much a necessity, as much a consequence as the running of water down hill, or the falling of a stone that has been projected into the air. But the governing laws are different and more complicated, and man can not, perhaps on account of his imperfect knowledge, control, or even always predict results.

But, doubtless, something may be done even with the present state of science; some facts have been observed, some principles discovered that may be turned to account, even in controlling the weather.

Travelers in the Sahara desert have reported seeing great rain storms in the clouds, but which did not reach the earth. We have all noticed how apparently difficult it is to rain during drouth, giving rise to the saying that "all signs of rain fail in a dry time." Since the conquest of Mexico by the Spaniards, the beautiful lake which surrounded the city, in the time of Montezuma, has nearly dried up. Numerous similar facts could be stated. Now, these are all due to the same cause. The sands of the desert are so hot, that the atmosphere taking up the radiated heat, becomes also hot. But ascending from the earth, the temperature gradually diminishes, until reaching the cloud region, two or three miles in height, it becomes cold enough to condense the vapors and produce rain. But decending through the lower and heated currents, the rain drops gradually evaporate into invisible vapor, and do not reach the earth.

At the time of the conquest of Mexico, it was the policy of the enlightened rulers of that country to preserve the forests. The Spaniards, out of contempt for everything heathen, cut these down. The result is the tropical sun dried and heated the earth, causing, as in the Sahara desert,

a constant radiation of heat into the atmosphere, tending to prevent rain.

Since the cultivation of Utah by the Mormons, it is said that Great Salt Lake is filling up, that the climate is gradually becoming more seasonable every year, requiring less irrigation.

Now, let us see if these facts are explainable. The Utah valleys were deserts; their fertility is the result of irrigation. The effect of irrigation, and the growth of vegetation, is to lower the temperature of the soil, and consequently that of the atmosphere above it, making it possible to rain from clouds that would otherwise discharge their moisture on the surrounding mountains.

It is an admitted fact, that forests, in consequence of the constant evaporation from their leaves, cool the atmosphere. Now, when the forests are cut away, as in Mexico and in this country, leaving the earth heated and bare in the sun, the atmosphere becomes warm from radiation, and there is a consequent diminution of rainfall.

But these facts are rather speculative than practical. We have no mountains or even hilly lands to grow timber, and while wood commands five and six dollars a cord, and wheat and corn good market prices, it is not probable that the process of removing the forests will be arrested. Something, however, might be done in this way. Occasional old fields which have ceased to become profitable to cultivate, the spaces along our streams and hillsides not arable, could be made profitable in growing trees; and in addition to the profit to the owner, they would tend to modify the severities of our climate.

In some countries it never rains. This is the case in Egypt, the Libyan and Sahara deserts. Egypt itself is but a narrow strip of country, snatched from the desert by the overflow of the Nile, widened out by the industry and ingenuity of man. In the time of the Ptolemies, Egypt had great canals, like rivers, leading out from the Nile, and artificial lakes which served as reservoirs against drouth.

When Alexander conquered Persia, he found the country

between the Euphrates and the Tigris, a constant garden. The irrigating canals formed an inconvenient impediment to the march of his armies. These lands are now comparatively a desert.

The crops of Spain, Italy, and, in fact nearly all southern and central Europe, have been greatly increased by irrigation. The strip of country in South America, lying between the Andes and the Pacific coast, is watered only by the dews of night, and irrigation, and are thus for thousands of miles made fruitful. The same is true of the Barbary states of northern Africa, and a great portion of central and southern Asia. Doubtless, it will some day be found profitable to utilize the waters of our rivers and creeks in the same way.

But innovations make slow progress. Though an interesting paper might be prepared on the subject of irrigation it is not probable that many farmers would be thereby induced to adopt the system in actual practice.

Let us look in another direction. Our old pioneers are not mistaken in their opinion that there is less water in our creeks and rivers, than at the time of the first settlement. This fact is not wholly, nor even in a great degree due to the diminution of rainfall. When the whole surface was covered with decaying vegetation for several inches in depth, and the ground too, was rendered porous by the roots of the trees penetrating two or three feet downwards, it is plain that the water after a hard rain did not hasten away to the streams, but sank into the earth, and thus gradually falling into the rivers and creeks, kept them up during the whole summer.

Shall we not interpret nature? Learn something of her laws, and profit something by the lessons which her own example teaches?

Let us imitate her. Let us produce a similiar condition in the soil, and thus utilize the rainfall we actually have.

We know that long cultivation, especially with shallow plowing, has deprived the soil of vegetable mold, rendered



it compact, so that the rain passes rapidly over the surface into the rivers and away to the sea.

We must render the soil loose and porous, deep down as the tree roots of the forest did, and in addition we must replenish it with vegetable mould, which absorbs and retains water.

For if the ground is porous, so as to permit the rains to pass readily into it, the moisture will be absorbed, and retained until it is gradually lost by evaporation.

Now, let us see what the cultivator may do in order to produce this condition of soil. Let him underdrain, as nature did, to the depth of thirty-six or forty inches. Let him plow and subsoil to at least half this depth. He will have thereby, a stratum of soil made porous, that will absorb and retain all the water that falls in any ordinary rain, and when it rains to excess, the underdrains will carry the excess away, after having left its precious gases as food for the growing crop.

By this deep underdraining, the heat of the surface is carried downwards, and the plant roots penetrate, even during the severest drouth, to moisture.

These roots annually decaying in the subsoil, render it every year more pervious to water, and therefore increase the capacity of this natural reservoir.

It is plain that when dry weather comes, the fields thus treated can experience no drouth. It has a supply against emergencies. The water comes up from below, and the roots penetrate downwards to meet it.

In addition to this artificial reservoir there is a natural and inexhaustable one, only a little deeper down. From this lower reservoir, the water during a drouth is always passing up towards the surface.\* By this deep cultivation, one has, so to speak, tapped the deeper reservoir, that which supplies our springs and wells, and given the water an easier passage upwards to the surface.

The rootlets of the growing plants sub-divide almost infinitessimally, permeating with innumerable fibres every

cubic inch of soil. These, in time of drouth, drink up the ascending water, and leave but little to evaporate.

Every one has noticed that vegetable mold will retain moisture for a long time. Soil, with a large amount of vegetable mold decaying in it, must add greatly to its capacity to resist drouth.

This mold may be supplied either by hauling to the soil decaying vegetable matter, as peat from the bogs, and barn-yard manure, or by turning under green crops to decay in the soil.

The rag weed, usually regarded as an unmitigated evil, seems to have reported itself for duty just as it was demanded. Our wheat fields, after the wheat has been taken off, often grow an enormous crop of this plant.

If all this vegetable matter, taken mainly from the atmosphere, could be plowed into the soil while green, it would add valuable fertilizing elements, and greatly increase its capacity to resist drouth.

Green clover, crops of millet, Hungarian grass or green corn, or what is probably best of all, Alsike clover plowed under, will rapidly supply the greatly needed vegetable mold.

Barn-yard manure, and indeed all vegetable matter, when thoroughly decomposed, not only add fertilizing elements, but act as invaluable agents to retain moisture.

In advocating deep culture, and a supply of vegetable mold to the soil, I am not sustained by theory alone. The conclusions are not the mere guesses of speculation, but the result of actual experiment.

In the cultivation of small fruits, demanding at the time of ripening an abundant supply of water, irrigation, wherever practicable, could be adopted with advantage. Where not practicable, a very excellent substitute is mulching. The mulch, while it readily admits the water, arrests evaporation, and keeps the ground for a long time, moist. From actual experiment, I have found that raspberries and blackberries treated to a thorough mulch, have been very little

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affected by the past few years of drouth. Almost any waste vegetable matter makes a good mulch.

Although I have alluded to irrigation as not likely soon to be practiced in this country, I see no reason that farmers, having streams flowing conveniently about their fields, should not utilize them in this way. The practice once commenced, would commend itself by results, and be rapidly extended. The subject of irrigation would, as in Italy, become an important part of engineering science, and our streams would not be permitted to run uselessly by.



## PREMIUM ESSAY ON UNDERDRAINING.

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BY DELOS WOOD.

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It would seem that in this age of improvement, when so much has been said and written of the great benefit of underdraining, that there would be no need of adding anything more to convince our farmers that it was the foundation, the chief corner-stone, whereon must be upreared the beautiful and remunerative superstructure of thorough and successful farming. Yet it is a notable fact that there are hundreds and thousands of those that would be incalculably benefited thereby, that either from indifference or unbelief refuse to examine for themselves and be convinced of the error of throwing away time and labor upon land so cold and wet as to nullify nearly all their efforts to produce paying crops. I recollect reading, some years ago, that perhaps the greatest evil the farmers of Ohio have to contend with is the tendency of our climate to extremes of drouth and moisture. This is eminently true of all heavy clay land, as well as of much of the ordinarily dry lands, of all of our western States, but the owners thereof seem to have accepted it as an evil to be endured, and have gone on, year after year, plowing in the mud, cultivating the clods, and harvesting upon the hard burned soil without ever making an effort to find a remedy. Indeed, the majority of them will even yet laugh you to scorn for suggesting that well laid tile drains, four feet below the surface, will remove all these difficulties. Yet it is nevertheless an uncontrovertible fact, being shown by experiments all

around us, if we will but open our eyes. To a superficial observer our tenacious clay soil looks like an insurmountable obstacle to underdraining. "Why," we are told, "what is the use? The water can not get in; it will stand in open ditches, when the soil, three feet from it, is as hard and dry as a brick." Yet the same men who thus object, complain that it is impossible to have a good cellar, because they can not keep the water out. I think this was told me fifty times, by as many different persons, while I was laying down tile on my own farm. But as it was not the water in the ditches, but that the soil below, that troubled me, I continued my work. If by laying tile four feet deep I could reduce the water-table (the line of the water saturating the soil) to the level of the floor of the drains, it would be out of my way, and the object aimed at would be accomplished. It was formerly thought that drains should have a light porous covering, in order to give free access to the surface water; but it is now considered by far the best way to pack the clay as solid as possible without displacing the tile; then the clear water, from which every particle of anything that would enrich the soil has been abstracted, will rise up into the drains and flow off; thus making room for that on the surface to sink down, carrying with it, also, all dirt and silt that would be likely to obstruct the drain. Thus it is easy to see that we receive all the benefit of whatever manure is applied to the soil, instead of having at least one-half of it carried away by the heavy rains, or burned up with the drouth. It has been said that "one load of manure, on drained land, is worth three on undrained land," and my own experience confirms it.

Mr. Gatling says, that "the importance and advantage of draining result not only from letting the water out of, but also from letting the air into the soil; thus warming the ground and putting it in a condition to more perfectly develop the plant food that it contains—a correlation of forces that produce very important and significant results."

To many it would seem that draining would only increase the ill effects of our summer drouth; but it is not so. Mr.

Waring says, "that lands which suffer most from drouth are most benefited by draining—more in their ability to withstand drouth than in any other particular. We have seen that the most retentive soil, the stiffest clay, is made porous by the repeated passage of water from the surface to the level of the drains, and the ability to admit air, that plowing gives it, is maintained for a much longer time if it were usually saturated with water, which has no other means of escape than evaporation at the surface." Drains only remove the surplus water, leaving, in the more porous soil, enough for all the necessities of vegetable life. This, also, draws up moisture from the water-table below, as any one can prove by setting an ordinary flower-pot, filled with perfectly dry earth, into a vessel containing water; it will soon be wetted even to the top. Thus plants, even in a dry season, are not likely to suffer on well drained land, and the owner is, therefore, not at the mercy of the elements, but to all intents and purposes, master of the situation. Another advantage resulting from underdraining is, that the farmer can plow both earlier and later in the season; and this of itself is sometimes equivalent to a good crop. A heavy rain in summer only stops the plow a few hours, and the field is often finished before the undrained land is in a condition to be commenced.

My first experiment in draining was made in a heavy clay field, having a gentle and nearly uniform inclination from south to north, where the surface water found an outlet in a creek that formed the northern boundary of the field. I first laid the main drain to receive the laterals, east and west about forty feet from the north side of the field, and discharging into the creek; the laterals are forty feet apart, lying up and down the hill, and receiving in some places the water from small underground springs. These laterals are of one and one-half inch tile, costing at the factory here \$15.00 per thousand. The main drain is of four and a half inch tile, costing \$40.00 per thousand. The creek into which they discharge is usually nearly dry in the summer season, but rises rapidly with every heavy rain, and is gen-

erally quite a stream through the winter. My outlet, in consequence, is often a foot under water, sometimes much more, but the stream from the drain can be traced clear and pure, for two or three feet in the muddy waters of the creek, showing that the discharge is perfect. I put down my own tile with the help of a man hired by the month, doing also in the time other ordinary farm work, consequently I am unable to give the precise cost, but allowing the established rates for my own labor, I consider \$20.00 per acre as covering all expense, while in my opinion the value of the land is more than doubled. This cost would, of course, vary with the size of the tiles used, and the character of the soil, which would determine the labor of digging.

The summer of 1871 was so exceedingly dry that I was often told that I would get nothing from that field, but on the contrary, it produced all the really good corn I had, while that adjoining, on the same kind of soil, and with precisely the same treatment, except the draining, rolled up and then burned up—not a leaf on the drained land curled until the corn was nearly ready to cut. But at the harvesting, the contrast was still more striking, that on the drained land averaged ninety bushels, shelled corn, per acre, while on the undrained it was not over thirty-five. This year it is in corn again, with precisely the same results. Last fall I plowed the undrained part up into ridges and left it to the action of the frost, then plowed it again in the spring, but it has not produced one-half as much corn as the other. Mr. Johnston, says, “tile draining pays for itself in two seasons, sometimes in one.” This is certainly true in my case. Its effects upon other crops is also well marked. In wheat, winter killing is almost done away with, as it is only on wet, heavy soils that heaving takes place, and as vegetation of all kinds starts earlier on the warm, dry soil of the drained land, wheat is usually ripened in time to escape the rust. Mr. Johnston, the pioneer of draining in this country, also considers it a preventive of the ravages of the fly.



Oats, in this part of Indiana, can never be raised successfully except in those favorable seasons, when the land can be plowed very early, and these are rare, the farmer but occasionally gets a crop. My drained land is dry enough to plow, some part, at least, of every month during the spring, and though I have not, as yet, sown oats upon it, it could have been done in good order even as early as February.

A neighbor who has been experimenting on the effects of underdraining on different crops, planted a small plat of potatoes upon a drained field, from which he dug forty-five bushels. In an undrained field of the same kind of soil, he measured off six times the amount of ground, planted it with the same kind of potatoes, and gave them the same cultivation, from which he dug fifty-two bushels.

The grass crop is not so much increased in quantity as improved in quality, the hay being of the very best, while all danger of its being displaced by sedge and other semi-aquatic grasses, is destroyed. Usually, in our climate and soil, clover suffers the second season quite as much as wheat, from the extreme alternations of freezing and thawing, which throws the roots out of the ground, breaking the small, fibrous working roots, and thus killing the plants. Mr. Waring tells us that with proper attention to manuring, and care to keep animals from its surface while it is wet from recent rains, to prevent "puddling," (compacting the soil like mortar) a meadow need not be broken up in a life time and may be relied on to produce uniformly good crops, always equal to the best obtained before drainage.

I have thus presented, in as condensed a form as possible, a few plain facts drawn from my own experience and observation, and hope the intelligent farmers of Indiana will take this subject into serious consideration? Are you not weary of cultivating your land for one-half of the crop it is capable of producing, and sometimes getting none at all? If you are disposed to try the effects of underdraining for yourselves take one acre of the best land you have that needs draining at all, and after the tile is laid put on the

usual amount of manure and then invest the value of the increase of crop in draining the next acre, and you will then find that the cost of draining your entire farm is in reality only that incurred in the expense of the first acre.

NORTH MADISON, IND.

## ESSAY ON UNDERDRAINING.

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BY THOMAS M. HAMILTON.

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*State Board of Agriculture:*

GENTLEMEN: Having had considerable experience in underdraining, I submit to your consideration my views as to the proper method of constructing drains, and the practical benefits resulting therefrom.

In the first place, I would seek to correct a mistaken notion that very many have with reference to the functions of the drain. Many suppose the object of an underdrain is to furnish a speedy outlet for a large amount of surface water, as it may fall in heavy rains, and thus prevent the water from standing long on the surface of the ground, thereby scalding out, as some say, portions of the growing crops, as well as to prevent the washing process consequent upon heavy rains upon more rolling lands. Not so. These are but secondary results, and of minor importance.

Lay your drains down deep (the deeper the better,) for the reason that the lateral drainage is in proportion to the depth as thirty-six to one in black loam soils, and in clay, perhaps, not more than eighteen to one; that is to say, a drain thirty inches under ground will drain a surface in width  $30 \times 36 = 1080$  inches, or ninety feet wide in black, loose soil, and in clayey soils perhaps not more than half so much, or forty-five feet; so that one readily sees how very valuable one inch at the bottom of a drain is, which gives us an additional width of two and a half feet of surface drained land. Not only so, but a second result is, that the

water being drawn off, the sun light and heat are found insinuating themselves into those hitherto damp and dark chambers. Now, let the rains descend, and the soil prepared to *drink* in an amount of water, which would flood the adjacent parallel belts of ninety feet, before calling upon our drain for its aid. So that we find that the office of the drain is not so much to carry off the water as it falls, as to constantly keep the soil in condition to drink in the rains, and at once appropriate its benefits (for heaven's showers are intended only to bless,) and not close the doors against, and thereby convert ministers of good into ministers of evil. Those infinitesimal and countless aqueducts are none the less serviceable as air *chambers* and windows, so to speak, opening out into heaven's sunlight.

Another immediate benefit resulting, is the fact, known and acknowledged by all good practical farmers, and by many philosophically understood, that ground well under-drained stands a drouth much better than before.

But as to the manner of constructing drains. The first thing of importance is to secure a *good out-let*. Spare no pains, for without this your drains will be more or less impaired in their usefulness. If it be necessary to cross your neighbor's eighty acre tract of land to secure this, *go*—with his help, if he will, but *go* any how, hoping that while you are redeeming his lands by so doing from a state of worthlessness, you may be kindly introducing into the barren region of his soul that which will transplant him in a more kindly soil. Get Paddy, with his long English spade (for he is the best ditching machine yet,) and if it be not full length, throw it aside, better to present him with a new one than to submit to the use of his, though worn but an inch. Hire your ditch cut by the inch, not by the spade, lest Paddy get too smart for you, and slant the spade too much, which he is sure to do. I have found this to be a very good and speedy way. Having staked out your line, take a good team and plow; run one furrow, using a cutter of course, thereby leveling your surface at once, dispensing with the line, gaining from five to eight inches, and making more graceful and

regular curves than is possible to get with a line; and then with an additional thirty inches, which can be attained at two spades, you will have a thirty-five or thirty-eight inch ditch, which will amply repay you for your extra trouble over the ordinary way. Use also the scraper to clean out the loose dirt, and never in any case set foot on the bottom of your ditch. The best and only level necessary is the water, which tells with unerring accuracy, a little of which is a great help in the cutting of your ditch. Have your tile distributed beforehand; lay and cover your tile as the cutting progresses. Cut your ditch only wide enough to admit the tile.

To place the tile in the drain, take a staff five or six feet long, with an arm eight or ten inches long, inserted at a right angle at the bottom, small enough to go in the tile, by means of which you can stand beside the ditch, and with a little practice place the tile as well or better than by hand, always observing to lay the tile in as straight a line as possible. Avoid walking on the tile, as some do while laying them, as they claim to settle them, for this can not be done without displacing them more or less. Having placed the tile in position, cover slightly with a shovel, always watching lest some might be displaced; after which use a horse and scraper, and to this end have the dirt thrown on one side. Proceed throughout upon the supposition that this is one of the *few* things appertaining to farming, which, if well and properly done, will not likely be to do over.

GREENSBURG, AUGUST, 1872.



## STATISTICS OF FENCES.

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There is, perhaps, no one item of expense to the farmer, greater than that of fences. The aggregate cost is enormous, and is yearly increasing with the rapid consumption of material suitable for fences.

In view of these facts, the question: How can this great cost be obviated, becomes a serious one.

There appears to be but one practicable means of doing this, viz: To, by law, compel all persons to keep their stock within their own enclosures.

There is a law in this State by which, on petition, by a majority of persons residing in a township, the county commissioners are authorized to prohibit stock from running at large. But this is impracticable, because the majority of neighbors dislike to object to the acts of another, when those acts are common practice. Hence, it would be well for the Legislature to enact such wholesome laws in the premises, as may seem necessary to compel all persons to take care of their own stock. The exception should be only when on petition of the majority of the residents of a township, the stock of such residents may be permitted to run at large, and thereby fix the blame for their depredations, and unnecessary cost of fences upon those who petition for it.

From the annual report of the commissioner of agriculture for 1871, we extract some facts and figures relating to fences in this State, and a comparison with other States similarly situated. The figures are startling, and the statement that the cost of fences in the United States is nearly "equal to the national debt, on which interest is paid, and the same as the

estimated value of all farm animals," is evidence sufficient to urge some steps to be taken to dispense with all unnecessary fences:

"It has been a mooted point, in the past, whether fences were intended to avert the destruction of corn by the cattle of neighbors, or to restrain one's own stock from similar depredations. For a long time the popular idea, logically interpreted, appeared to be that corn should be restrained to prevent depredations upon cattle. Another question, of which a solution has been desired, is whether the money invested in farm stock or that in farm fences is the greater sum. It is certain that the fence investment is a large one, and strongly suspected that much of it is avoidable and unprofitable. While rapidly paying the national debt, it is possible that the American people may discover a means of reducing another of almost equal proportions. In the one case the annual tax is a fixed sum, which is less than legal interest upon the entire principal; in the other, it is legal interest on the whole amount, and a still larger tax for depreciation of the principal, thus more than doubling the tax, and rendering the fence debt a heavier burden than the war debt.

"It is beginning to be seen that our fence laws are inequitable in a greater degree than is required by the principle of yielding something of personal right, when necessary, for the general good. When a score of young farmers "go West," with strong hands and little cash in them, but a munificent promise to each of a homestead worth \$200 now, and \$2,000 in the future, for less than \$20 in land office fees, they often find that \$1,000 will be required to fence scantily each farm, with little benefit to themselves, but mainly for mutual protection against a single stock-grower, rich in cattle, and becoming richer by feeding them without cost upon the unpurchased prairie. This little community of twenty families can not see the justice of the requirement which compels the expenditure of \$20,000 to protect their crops from injury by the nomadic cattle of their unsettled neighbor, which may not be worth \$10,000 altogether.



There is also inequality in the tax which fencing levies upon the farmers, the rate of which increases with the decrease of the area ; for example, a farmer inclosing a section of land, 640 acres, with a cheap fence costing but \$1 per rod, pays \$1,280 for as many rods of fence, or \$2 per acre ; another, with a quarter section, 160 acres, pays \$640, or \$4 per acre ; while a third, who is only able to hold 40 acres, must pay \$320, or \$8 per acre. Thus the fencing system is one of differential mortgages, the poor man in this case being burdened with an extra mortgage of \$6 per acre which his richer neighbor is not compelled to bear. All these acres are of equal intrinsic and productive value, but those of the larger farm have each but a fourth of the annual burden thrown upon the smaller homestead, and the whole expense may be for protection against trespassing cattle owned by others.

“But it is not proposed to discuss the fence question. It is necessary, first, to obtain possession of its facts, ascertain what kinds of fence are used, the number of rods of each, and the cost of each. The census furnishes no light upon it, and local collections of these essential facts are few and imperfect. The best that can be done at the present is to seek county estimates of kind, amount, and cost, from careful analysis of ascertained facts. As a preliminary effort is this direction, in the absence of a thorough census, the following series of questions was addressed to the regular statistical correspondents of this Department :

“1. What descriptions of farm fences are made in your county ? If of more than one kind, the proportions of each, expressed as percentages of the total quantity ?

“2. What is the average height and prevailing mode of construction of each kind ?

“3. What is your estimate, for the farms of your county, of the average number of rods of fence to each one hundred acres of farm lands, including together improved and unimproved lands ?

“4. What is your estimate, for the whole county, of the average size (number of acres) of inclosures or fields ?

"5. Average price of boards used for fences per thousand?

"6. Average price of rails per thousand?

"7. What proportion of openings have bars, and what proportion gates? style and cost of gates?

"8. Average cost per rod of worm-fence; of post and rails; of board-fence; of stone wall; of other kinds?

"9. Average cost per hundred rods of annual repairs of all farm-fences?

"10. What kinds of wood are used as fence material, and what the relative cost of each?

"11. What is the comparative durability of each kind?

"Returns were made from 846 counties, nearly all answering every question, some very fully. As a sample of the most exhaustive, the following, from Hon. John M. Millikin, of Butler county, Ohio, is given in full:

"1. Our farm-fences consist of common worm rail fence, and (what can hardly be called a fence) of osage-orange hedge. There are no data by which to determine accurately the proportion of each. My estimate is 80 per cent. rail-fence, 15 per cent. board-fence, and 5 per cent. hedge-fence.

"2. Our worm rail fence varies in height. They are from seven to nine rails high, including riders. Our board-fence is usually made of 16-foot boards, 1 inch thick and 6 inches wide. Posts 8 feet apart. Black locust posts always preferred. Red cedar, white cedar, and oak posts all used, and esteemed for durability, in the order named. Most people make their board-fence five boards high, and then cap it. Recently many are only using four boards, and capping with the fifth.

"3. In 1857 I made a very careful estimate of the number of rods of fence in this county, and the cost of the same. I also estimated the annual interest on the same, and the annual expense of keeping the same in repair. These estimates were made for the purpose of showing the necessity of having a law enacted to prevent cattle from running at large. I presented my statement to the State Agricultural Convention, and the ultimate result was the passage of a

very valuable law restraining cattle from running at large. As yet, it is not yet generally enforced, but is accomplishing good results. My data, then used, I can not find, and must, therefore, hastily make another estimate. So much preliminary. Our farms, of 100 acres each, will average from 875 to 950 rods of fence—say fully 900 rods.

“4. We have in this county about 4,000 farms, varying in size from 30 acres to 400 acres. Of the latter we have some thirty or forty. Each farm, on an average, will have about eight fields, and we have therefore, “of inclosures or fields,” at least 32,000. This estimate does not include numerous small lots which every farmer has in immediate connection with the barn-yard.

“5. The average price for fencing-boards is about \$22 per thousand.

“6. Good oak rails are worth \$70 per thousand.

“7. Nearly all inclosures are now provided with gates. There are scarcely more than one pair bars to fifteen gates. In some neighborhoods bars have been entirely superseded by gates. Gates are usually made with common fencing-boards, one inch thick and six inches wide; a post 3 by 4 at one end and 2 by 3 at the other end. Braces of boards of like size, extending from bottom of the larger post to the top of the smaller. Cost about \$3.

“8. New worm-fence will cost about \$1.75 per rod. Post and rail fence has almost gone out of use. I have seen none made within the last twenty years, with the exception of one string. It would cost per panel of ten feet, about \$1.80. Board-fence per rod, good lumber, and locust or red cedar post, will cost about \$2 four boards high, and \$2.15 to \$2.20 five boards high. Stone walls are not constructed and used as fences in this county.

“9. I know of no way of answering this question satisfactorily, as the annual repairs will so much depend upon the age, material, etc., of the fence. From the investigations I have made, I am satisfied that it will take 15 per cent. per annum of the original cost of the fence to pay interest and keep up repairs.

"10. Farmers prefer oak and walnut rails. The latter would probably cost \$1.20 per thousand, and are not now used. Where rails are used now, farmers are willing to make them out of almost any kind of timber. Where board-fence is made, pine boards are preferred. Locust and red cedar posts are preferred, costing about 35 cents each. Oak posts are somewhat cheaper, but less durable.

"11. Locust posts are believed not only to be stronger than cedar, but they hold nails better, and are more durable.

"Permit me to add further. We have in this county 293,000 acres of land, all inclosed. We have at least 2,600,000 rods of fencing, some costing largely more, yes, four-fold the price at which I have estimated our fences per rod. But for the purpose of estimating the annual cost of maintaining our fences, including interest, let me put the average at \$2 per rod; 2,600,000 rods of fence, at \$2, will cost \$5,200,000. Annual cost of maintaining same, (including interest,) at 15 per cent. on original cost, \$780,000. These figures are astounding, and yet I believe that they are not too high. Material for rail fences will soon be out of the question, and lumber of every kind is annually becoming scarcer, and necessarily will increase in price. Is it not, therefore, highly important that laws restraining stock from running at large should meet with more favor; that fields should be enlarged; that soiling should be more practiced, and that farmers should thereby be relieved from the great burden of paying such immense sums for fencing?

"The replies to the inquiry as to kind of fences and mode of construction are necessarily monotonous from their repetition of details; they show that the common forms of fencing are substantially alike in all parts of the country, yet varied everywhere to accommodate the differences in kind, quality, comparative scarcity, and cost of timber; and present the Virginia rail-fences the pioneer in all timbered districts, from the simplicity of its construction, not even requiring nails, but rails only. The tendency to supersede this form with a fence requiring less timber and occupying

less space, while presenting to the eye more artistic features, is manifestly growing.

“In forty-seven counties in Ohio, the percentage of worm-fence is about 85, board-fence about 10 per cent., post and rail, stone, picket hedge, and patent fences making the remainder. The height in most localities is from  $4\frac{1}{2}$  to 5 feet. The proportion of worm-fence in Michigan is about four-fifths, board being also used quite generally, with a small amount of stone, brush, log, and other structures, and some hedging. The height is in most counties  $4\frac{1}{2}$  feet. Indiana, which is well wooded, uses the Virginia style for four-fifths of all fencing. In Lake county there is little else than board fence; 50 per cent. in Newton, 40 in Warren, and 20 in Switzerland, Fountain, Jefferson, and Vanderburg. Small quantities of osage-hedge are found in all sections of the State. Worm-fences vary in height from seven to eleven rails to the panel, being highest in the cattle-farms of the southwestern part of the State.

“In the prairie States the worm-fence has less prominence. The scarcity of timber limits the use of rails, except for a fence of three or four rails to the panel, with posts, where native wood is to be obtained at all, from margins of streams or artificial plantations of forest trees. The open prairies, having railroad communication, are fenced with boards from the northern pineries, with cedar and locust posts, if obtainable without great cost, otherwise with oak and sometimes chestnut. In Southern Illinois timber is abundant, and the old-fashioned rail-fence is largely used. From fifty-six counties of Illinois, which may be assumed to represent the State quite fairly, returns make a percentage of 43 for worm-fence and 32 for board, osage-hedge standing next in prominence. Some counties already have a very large proportion of this hedge, viz.: Kankakee, 75 per cent.; Henderson and Stark, 50; Marshall, 40; Macoupin, 33; Knox, 30; Rock Island, Warren, Lee, Adams, Madison, Whiteside, 25; and Bureau, Fulton, Peoria, Crawford, 20. It is coming into general use with great rapidity. In Richland osage-hedge is not popular, the expense of trim-

ming being deemed greater than repairs of other fences. In thirty-four counties in which osage-hedges are particularly mentioned, the average percentage is about 20.

“Worm-fence constitutes 54 per cent. of the reported fencing of Wisconsin, and board fence 32 per cent. Post and pole, log, brush, stone, ditch, “Shanghai,” and various fancy styles, are made. Ingenuity is exercised in prairie regions for the invention and building of fences requiring the smallest possible amount of material. A hurdle-fence is popular in Rock, supported by short stakes which reach to the third rail, which is longer than the others, thus lapping over and connecting one panel with another.

“In Minnesota the proportions of the principal kinds are as follows: Worm, 33 per cent.; post and rail, 27; board, 26; and 14 per cent. of other kinds, including (tamarack,) pole, wire, “leaning,” and other fences. Average height, about  $4\frac{1}{2}$  feet. Oak and pine are used in construction of board fence, while walnut, ash, cottonwood, tamarack, elm, linn, and other woods are used for rails.

“No greater variety of fencing exists in any State than is found in Iowa. An average of 48 county returns indicates 24 per cent. of worm, 23 of board, 14 of post and rail, and 39 of a miscellaneous list of styles, among which osage-hedge is the most prominent, reaching 60 per cent. in Cedar, 33 per cent. in Clinton, 25 in Scott, and smaller proportions in many other counties. In Muscatine the proportion of board is 90 per cent., 80 in Harrison, 75 in Scott, and 50 in Henry and Jasper. In Mitchell 63 per cent. is post and rail, and 50 in Carroll and Floyd. The “Shanghai” fence is made of rails, three to five to the panel, laid on the crotches of forked stakes driven into the ground, staked and surmounted with riders. In Mahaska, as in other counties, some inclosures include a dozen farms in a tract of 2,000 acres or more. A “leaning” fence is used in some places, the posts set at an angle of  $40^\circ$ . The “Bloomer” is made with three rails and stakes to the panel. Several counties have no fences, animals being prohibited by law from running at large. Five wires, 8

inches apart, stretched upon posts 8 feet apart, with one stay midway, makes a popular fence in some places.

"The worm-fence again predominates in Missouri, amounting to 74 per cent., while there is 26 per cent. of board-fence, and "corduroy" (poles nailed to posts) hedge, post and slat, stone, pailings, "rough and ready," and fancy styles. There is 30 per cent. of osage-hedge in Henry, 20 in Greene, and a large amount of growing hedges in different parts of the State. From seven to twelve rails to the panel are used in worm-fences. Post and rail fence is often made with three rails for cattle and six for hogs, and board-fence with three or five boards.

"It is difficult to calculate the comparative prominence of styles in Kansas. Averaging the returns, the worm-fence appears to constitute but 18 per cent., board 12, and post and rail 9; leaving 61 per cent. for a great variety of fences reported somewhat indefinitely. The osage-hedge is very prominent, apparently bidding fair to be the principal fence of the State. It is reported at 100 per cent. in Cloud; 50 in Bourbon, Franklin, Linn and Osage; 40 in Leavenworth; 33 in Douglass; 30 in Anderson. Dickinson reports 400 rods of stone wall, built at \$2 per rod. The Shanghai fence is also found in Kansas. Cherokee county reports fences with names hitherto unheard of "the eccentricity of whose construction language very feebly conveys."

"In many counties of Nebraska few fences are to be found. About 30 per cent. of existing fences are post and rail, 25 per cent. board, and the remainder hedge, wire, Shanghai, and earth walls 3½ feet high; Hall county having 25 per cent. of the latter.

"Board-fence appears to predominate in California; two-fifths being of that style in the counties reported, nearly one-fourth post and rail, and the remainder brush, picket, worm, etc., including a small amount of live willow. Napa and Humboldt have a considerable proportion of worm-fence.

"A large proportion, fully 90 per cent. in the returns received, of the fencing of Oregon, is of Virginia style.

The remainder is mainly constructed with boards. A few picket-fences are reported.

“In Washington Territory wood is abundant; worm-fence is the prevailing style. Utah has poor material for fencing; is inclosed with poles, brush, post and rail, and inferior forms of fences. Red pine is much used for rails, and aspen poles are abundant. Fence material is scarce in Colorado, except among the mountains. In the dry atmosphere of the mountains, pines, firs, aspen, and other soft woods last well. A Utah correspondent says the aspen will last twenty years if not resting on the ground. There are few fences in New Mexico. There is a law against trespass, and each county is allowed to regulate the time when cattle may be turned loose, which is generally from November 1 to March 1. From corn-planting till harvest is finished cattle must be herded, and the owner is made responsible for any damages they may commit. The Dona Ana correspondent says there is not a rail in New Mexico. Walls are built for small inclosures of adobe, or unburned brick. A fence is sometimes built of cedar poles, set upright and close together, with a horizontal pole bound to each upright, near the top, by strips of raw hide an inch wide. In Arizona and Nevada small poles are much used for fencing, though a small area only is inclosed.

“In recapitulation it will be seen that worm-fence predominates in Vermont, New York, and in all States west and northwest of New Jersey, except Kansas, Nebraska, California, and Nevada, and the Rocky Mountain region, though but slightly in Vermont, Minnesota, and Iowa. Its proportion in the former States exceeds that of all other kinds combined, except in Vermont, New York, Illinois, and Iowa, in the latter constituting scarcely one-fourth of the total fencing. It may fairly be ranked as the national fence, though it is temporary, giving way gradually to kinds requiring less lumber, and covering less land, as well as making a less awkward appearance, not at all indicative of the straight-forwardness of the American character. Board fence is the prevalent style in California, and next to



worm in Vermont, New York, in all the Southern States south and west of Maryland, (though the percentage is still small,) and in all the Western States in which worm fence predominates, except Minnesota and Nebraska. The post and rail style is the main fence in New Jersey, and stands second to other kinds in Maine, Massachusetts, Pennsylvania, Delaware, Maryland, Minnesota, and Nebraska. Stone-wall is the principal fence in Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut; and the next in prominence in New Hampshire, Rhode Island, and Connecticut, is board fence. For hedges, the osage orange stands first, being already in efficient condition in Illinois, and largely planted west of the Mississippi; while it is coming gradually into use in all of the Middle and Western States south of the fortieth parallel of latitude, and, to some extent, for ornamental purposes in the Southern States. The Cherokee and McCartney rose (botanically, *Rosa laevigata* and *R. Macartnea*,) are preferred by many as hedge plants in the States of the Gulf coast. The white willow, *Salix alba*, and other plants are employed for hedging purposes to a very limited extent."

The cost of fencing in Indiana is estimated at \$100,759,-415. The number of rods of fencing at 95,961,348. The number of acres under fence at 14,111,963. Average cost per acre for fence is \$1.08. Average rods per acre 6 46. The average cost of repairs of fences for Indiana, is estimated at \$5.40 per 100 rods, and the total annual cost of repairs \$5,181,912.

"The exhibit for the United States makes the cost of fences nearly equal to the total amount of the national debt, on which interest is paid, and about the same as the estimated value of all farm animals. For every dollar invested in live stock, another dollar is required for the construction of defences to resist their attacks on farm production. Experiment has proved that at least half this expense is unnecessary.

"Wherever it has been tried, and wherever farm animals are restrained, and their owners are placed under (fence) bonds for the good behavior of their restless dependants, the

system is regarded with general and growing satisfaction. Capital is released from unprofitable investment, and made available for farm improvements, soiling is encouraged, the manurial resources of stock husbanded, and the way prepared for larger production and higher profit. Even where a herd law of some sort has not been enacted, the tendency is strong, as many correspondents assert, toward the reduction of the amount of fencing, as repairs are needed, division fences are taken down, and the material used to keep outside fences in repair. Fields are almost everywhere becoming larger. In the younger States a single field often answers all requirements, and sometimes a single enclosure embraces within its bounds many a farm. The entire town of Greeley, in Colorado, with its suburbs for gardens, and small market farms, is surrounded with a single fence, the cattle being excluded, and kept outside upon the illimitable plains. It is possible to dispense with fencing to the amount of \$1,000,000,000 in the United States, and the advantage of the change would greatly overbalance the inconvenience of it. Let the farmers discuss the subject in the light of actual experiment, rather than under the influence of ancient prejudice, and their view will soon coincide with their true interests."

# Cheap Homes Needed to Insure Continued Prosperity.

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BY T. A. GOODWIN.

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There is a fact or two relating to agriculture and manufacturing which demands the serious attention not of those only who are engaged in these pursuits, but of political economists of every calling. What has arrested public attention in the east is true in the older portions of Indiana. The rural districts are not as populous as they were twenty-five years ago. Small farmers have sold out to larger ones, and for the most part gone to towns and cities, contributing largely to that unstable class of citizens known as day laborers, not going so largely into the ranks of skilled labor as into the generally homeless class alluded to. The cause of this should be searched out, and if within the reach of governmental control, should be remedied. Doubtless the greater attraction of village social life, with its schools and churches, with one class, and its vicious associations with another, has something to do with it, but it is more probable that the grasping of wealthy persons after real estate as a safe and profitable investment, lies at the bottom. This monopolizing of lands by the few gives them a value in the market which puts them out of the reach of the poorer class of citizens. We say nothing against large farms and large farmers. We would as soon inveigh against large factories, but when merchants, bankers and professional men and thrifty mechanics buy up not only lands adjacent to their

villages to hold on speculation, and to rent out to those who till them, but also appropriate the best of the lands on the frontier, so that the poor man who wants to make him a home, even at the expense of going away from the associations of society, must pay an exorbitant advance to the absent land owner, not to call him a land shark. It is time that legislation should interfere for the protection of the helpless, if it possibly can.

Our agricultural interests are suffering from this state of affairs, with the evil increasing from year to year. It will be a sad condition when the tillers of the soil are chiefly the serfs or tenants of land owners. National prosperity does not depend so much on the value of the products, measured by dollars as upon the number of happy homes. This monopolizing of farming lands by non-residents threatens to bring upon us, in no small degree, the evils of absenteeism which has so long cursed Ireland. It does not matter in its practical results whether the absent landlord lives in the adjacent village or a thousand miles off. This evil is also seriously affecting the laboring classes in towns and cities. The same spirit of monopoly grasps the vacant lots and holds them on speculation, requiring the labor of others to enhance the value of these useless lots, while demanding exorbitant prices for them.

The remedy for this is not obvious. But where there is a will there is a way. Once let the laboring population demand reform and a way will be found.

Great relief would be afforded by requiring the assessors to place the actual value of these lands and lots on the duplicate for taxation. Very little real estate is assessed at over two-thirds its actual selling value, and in many instances not one-fourth, while every hen and duck of the tenant and the sewing machine of the widow is put down at full value. But if in no other way, a new constitution might provide for levying an extra tax on real estate not occupied by the owner. This would cheapen lands and lots, and thousands would own their own homesteads, who now live and die landless.

# THE SIGNAL SERVICE SYSTEM.

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INDIANAPOLIS, IND., September 20, 1872.

*Secretary of the Indiana State Board of Agriculture:*

SIR—By your request I have the honor to submit the following remarks regarding the Meteorological Division of the Signal Service U. S. Army.

Meteorology had been too long treated with neglect, both in popular and liberal systems of education. The causes of this neglect are not far to seek; the chief being the absurd pretensions of weather-prophets and other prognosticators; the free and bad use long made of electricity and other imperfectly understood agents to explain the causes of atmospheric disturbances; the few observed facts in comparison with the vastness of the weather changes they were adduced to explain, but above all, the real difficulty of the subject, owing to the manifold influences in operation. But now that meteorology has discarded all pretensions and theories, except in so far as the latter are the legitimate results of observation, it has acquired rapid development and established its claim to be regarded as the youngest of sciences.

In consequence of this, a great and growing interest on the subject is spreading among all classes, as is evinced by the numbers of meteorological instruments purchased by many observers in all parts of the civilized world.

The importance of regular meteorological reports was early recognized in this country, for the medical department of the United States Army commenced taking observations in 1819. The States of New York, Pennsylvania and Ohio

followed in 1825, 1837, and 1842 respectively, and the Smithsonian Reports in 1849. These observations, while valuable to the scientific world as studies for future application, or in reference to the sanitary condition of localities, were at first of no immediate benefit, and it was only when the introduction of the telegraph made their rapid transmission possible that attention was drawn to the possibility of practical storm warnings.

In 1857 the Smithsonian Institute in Washington was in daily receipt of weather telegrams, transmitted gratuitously by the telegraph companies from various places east of the Mississippi and as far north as New York, but they were discontinued at the breaking out of the war in 1861, renewed again temporarily in 1862, and finally they were discontinued again, owing to the cessation of observations in the south and southwest, and the constant use by the Government of the telegraph lines.

In 1863 the newly appointed Commissioner of Agriculture commenced the monthly publication of a bulletin, giving the state of the weather and condition of the crops throughout the country, from data furnished by correspondents; this publication is still continued, and is of value to the agricultural interests of the country.

In 1869, a daily bulletin of the weather was published for three months in Cincinnati, Ohio, under the direction of Professor Cleveland Abbe, a gentleman prominent among meteorologists, and at present assistant to the Chief Signal Officer at Washington. This experiment proved very successful and was renewed the following year.

In 1858, the American Association for the Advancement of Science appointed a committee for the organization of a national system of meteorological observations, and a plan was presented, which provided for the appointment of a Superintendent in each State, who was to collect and collate all observations within its boundaries, and forward them monthly to Washington. The expense of maintaining such a system was to be borne by the different States. At the time no action was taken in the matter, but since 1863 sev-

eral persons have endeavored to get congressional assistance in organizing the national system suggested by the Association in 1858; Mr. A. Watson, of Washington, has been earnest in advocating in the papers a system of storm signals for the benefit of agriculture.

Professor I. W. Lapham, LL.D., of Milwaukee, has been a persistent and successful advocate of the importance of some national system of weather reports, in which the telegraph was to play an important part, and he brought powerful arguments to bear in the shape of statistics, showing the loss of shipping on our lakes alone for a series of years. His views were brought strongly to the notice of Congress in 1869, in a memorial replete with interest. By coincidence, papers and maps in reference to the same subject were prepared in the War Department at the time the memorial was submitted.

The matter was finally brought to the attention of Congress by the Hon. H. E. Paine, of Wisconsin, who offered the following joint resolution which passed, without dissent, both Houses of Congress, and became by the approval of the President, a law on the 9th of February, 1870:

[PUBLIC RESOLUTION No. 9.]

*"Be it Resolved, etc., That the Secretary of War be and he is hereby authorized and required to provide for taking meteorological observations at the military stations in the interior of the Continent, and at other points in the States and Territories of the United States, and for giving notice on the northern lakes and on the sea coast, by magnetic telegraph and marine signals, of the approach and force of storms."*

By a general order from Headquarters of the Army, March 15, 1870, issued by authority of the Hon. Wm. W. Belknap, Secretary of War, Brevet Brigadier General A. I. Meyer, the Chief Signal Officer of the army was charged, subject to direction of the Secretary War, with the execution of this enactment.

The experience of nearly two years, has proven the wisdom of the act of Congress which placed the service under military control. A rigor, less than that of military discipline, could not have secured that strict obedience to orders which has become necessary.

The plans for a system of storm warnings, as intended by Congress, had been so well prepared, that it was possible to begin action as soon as the appropriation had been made. The stations where observations were to be made, were fixed by the study of the geographical relations of the points to each other, and what was known of the general course of storms, and by their situation in reference to the facilities for the necessary telegraphic communications; they were selected after a consultation with some of the best meteorologists in the United States. The fact that in the temperate zone, storms, and I think I am justified in saying, all changes of temperature and weather, come from some westerly point and follow an easterly course, assisted materially in the selection of stations of observations, and rendered the application of storm warnings in the United States of immediate utility. As soon as a storm appears in the territory bordering on the Rocky Mountains, it becomes possible, in many cases, with proper arrangements, to telegraph its approach to eastern places in time to enable preparation being made against its destructive influences. In view of the above proven facts the stations have been selected, so that a storm or atmospheric change felt first at Cheyenne, Fort Benton or Santa Fe, can be traced, or notice given in advance across the whole continent to the lakes and eastern sea coasts.

The character and frequency of meteorological observations at the different stations, and the most economical mode of sending them over the wires was arranged. Necessary instruments selected, and observers were engaged. To provide the observers at the different stations was a subject of anxious consideration; the law in its scope seemed to require that competent men should make such careful observations and report them under such rules that they might



stand safely as standard. It was thought not absolutely necessary that the observers should be scientific men, but still it was evident the higher their grade of education the better. Intelligent men were enlisted and after a complete course of instruction, and having proven their competency by a rigid examination, they were sent out, provided with proper instruments and instructions, to the different stations.

The subject of the provision of instruments and their proper use had been, and must be, one of principal importance. Each station was equipped with a barometer, a thermometer, a hygrometer, an anemometer, a vane and rainguage. The instruments are made upon similar plans and compared—those of them of which comparison is necessary—with standards at Washington.

The telegraphic transmission of the regular reports presented at first some difficulty, but the different telegraph companies wishing to do their share in a work they regarded as for the common good, assisted materially, by their liberality and fairness, to bring this difficult problem to a favorable solution. Circuits over the lines of the different telegraph companies were arranged in such a manner that it was possible to exchange message reports between different groups of observation stations, between different places or stations in different groups; and finally for the assembling of all dispatches in Washington. It is very much to be regretted that the working of the different telegraphic circuits has been frequently interrupted in consequence of misunderstanding as to the powers of the United States in relation to the telegraph lines. These powers, as expressed in the act of 1866, secure to the United States precedence for the transmission of Government dispatches over lines which have availed themselves of its condition, and also imposed upon the Postmaster General the duty of fixing annually the rates at which such messages shall be transmitted. These rates did not appear liberal enough to the Western Union Telegraph Company.

The sudden cessation of reports have placed the War Department in an unfortunate position, and extending in

their consequences to so many interests, they might have proven disastrous; but in these emergencies the Franklin, the Pacific & Atlantic and Atlantic & Pacific companies tendered their services promptly and assured the transmission of reports from all points to which their lines extended, while the International Ocean Cable Telegraph Company continued its services without interruption, and with a spirit of accommodation. Such embarrassments, injurious, to a great extent, to the efficiency of the Meteorological service can not be remedied until the United States secures, by some arrangement, the absolute control of the lines extending over its territory.

On November 1, 1870, at 7.35 A. M., Washington time, the first systematized synchronous meteoric reports ever taken in the United States, were read from the instruments by the Observers of the Signal Service, at twenty-four stations and placed upon the telegraph wires for transmission. With the delivery of these reports, at Washington and other cities and ports, to which it had been arranged they should be sent, which delivery was made by 9 A. M., commenced the practical working of this division of the Signal Service in this country. The pleasant feeling with which the service was everywhere recognized, expressed the great interest taken by the public in all sections of the country. In all cities where a benefit could be had from these weather reports, Chambers of Commerce and Boards of Agriculture have appointed committees, to assist the War Department to extend and make perfect a service which must become in time, if not already, one of the most important and useful.

Since its commencement, it has gradually extended, by adding new stations of observation, as well as by the manner of publishing the results of these observations. At the beginning the tabulated reports of the different stations were only bulletined or published by the papers, but soon it became apparent that popular will, as well as the views of eminent scientific men, required the publication of deductions of some kind, had from the material received at the

Chief Signal Office, and in consequence the issue of a synopsis of the weather which had prevailed during past twenty-four hours at the different stations, and probabilities of the weather to be expected, were commenced officially, after a mature trial in private, February 19, 1871, and have been made and issued to the press, thrice daily since that date.

These synopsis and especially the probabilities, with which the public is familiar through the columns of the different newspapers, have often been the cause of wonder and admiration to the reading public, not acquainted with the vast means at the disposal of the Department and the uniform and reliable rules of atmospheric changes from east to west; this truthfulness and correctness has been everywhere acknowledged and confidence expressed in them, by all who have perused them from time to time. It is only to be regretted that the limited means of the Department make it necessary to telegraph them to the press in only a limited number of words, giving only generalizations embracing large sections of the country, but surely the time must soon come, and the experience of the authors of the probabilities will have advanced to such a high state of perfection, by daily experience, that they will be issued with perfect safety and reliance for smaller sections, as perhaps States. In the study of local probabilities, the reader should make sure that he will have before him (as in the columns of the local newspapers) the latest synopsis and probabilities issued at Washington. To be sure of such facts he must notice the hours at which they are dated from the office at Washington. The report issued at Washington at 7.35 P. M., will be found daily in all papers of Indianapolis, and as I believe in the west, for the report issued at 1 A. M., which would be in fact most reliable, having been deduced from the latest reports, arrive too late for publication.

The following places now occupied as stations of this division have been selected, as previously remarked, as of most immediate importance for meteorological purposes, and possessing telegraphic facilities. Those which are grad-

ually to be added, are already designated by the Secretary of War, for similar reasons, with a design to perfect the network of the system so far as the appropriations allow:

*Portland, Me.	*Boston, Mass.
*New London, Conn.	*New York City, N. Y.
*Philadelphia, Pa.	*Baltimore, Md.
*Washington, D. C.	*Wilmington, N. C.
*Charleston, S. C.	*Savannah, Ga.
*Augusta, Ga.	Lake City, Fla.
Key West, Fla.	*Mobile, Ala.
*New Orleans, La.	San Francisco, Cal.
*Norfolk, Va.	Mt. Washington, N. H.
Jacksonville, Fla.	Montgomery, Ala.
*Oswego, N. Y.	*Rochester, N. Y.
*Buffalo, N. Y.	*Cleveland, Ohio.
*Toledo, Ohio.	*Detroit, Mich.
*Milwaukee, Wis.	*Chicago, Ill.
*Duluth, Minn.	*St. Paul, Minn.
Knoxville, Tenn.	*Pittsburg, Pa.
Lynchburg, Va.	*Indianapolis, Ind.
*Keokuk, Iowa.	Burlington, Vt.
*Vicksburg, Miss.	*Grand Haven, Mich.
Marquette, Mich.	Escanaba, Mich.
*Davenport, Iowa.	*Memphis, Tenn.
*Cairo, Ill.	*Leavenworth, Kansas.
*Galveston, Texas.	*Cape May, N. J.
Punta Rassa, Fla.	*Montreal, Canada.
*Cincinnati, Ohio.	*Nashville, Tenn.
Omaha, Neb.	*St. Louis, Mo.
Corinna, Utah.	Cheyenne, Wy. T.
*Louisville, Ky.	Shreveport, La.
Santa Fe, N. M.	Denver, Col.
Portland, Oregon.	Fort Benton, Mon. T.
Virginia City, M. T.	San Diego, Cal.
Breckenridge, Minn.	Indianola, Texas.
Alpena, Mich.	Fort Sully, D. T.

At those places marked with a star, the number of reports

received and published in the bulletin is sufficiently large to permit them to be used by the reader in making forecasts of the weather. The remaining stations are now only used as reporting stations.

At every station three observations are taken daily, at the same moment of actual (not local) time for all stations. The reports are immediately telegraphed to the office of the Chief Signal Officer at Washington. By the carefully arranged system of telegraphic operation, copies of the full reports of all the stations thus transmitted to Washington, or a portion of them, are sent at the same time to many of the Signal Service Stations in principal cities and towns.

At each station so receiving a tabulated report, one or more bulletins are published. The observations are made synchronously at the different stations at the exact hours, 7.35 A. M., 4.35 P. M. and 11.35 P. M., Washington time.

The bulletins exhibit the following particulars, viz.: Height of barometer; change since last report; thermometer; change in last twenty-four hours; relative humidity, in per cent; direction of wind; velocity of wind, in miles per hour; pressure of wind, in pounds per square foot; force of wind reduced to Beafort scale; amount of cloud, both upper and lower, and direction of movement of former; rainfall since last report, in inches and hundreths; rise or fall of the principal rivers during twenty-four hours, and state of weather.

The morning and afternoon reports (bulletins) are posted at each of the local Signal Service offices, and at a number of other public places in the cities and towns to which they are transmitted. They are always open for examination.

At more prominent stations, and those in principal cities, large weather maps are also posted every morning, exhibiting by means of changeable symbols, the reports of the morning observations at the different stations. Also a number of smaller maps are printed on presses provided for that purpose. They are published with the bulletins.

The midnight report (bulletin) is gratuitously furnished to every morning paper published in the city, at which a

station of observation may be, that will insert it in its columns. The morning report is also delivered to afternoon papers in time for publication.

The use of the bulletined reports would often, perhaps, enable the student to make forecasts of the weather with greater local particularity than can be expressed in the "synopsis and probabilities," telegraphed to the press, as the latter, must, in a limited number of words, give generalizations embracing the whole country. And, it is believed that in many places, distant from any station, but on or near the lines of railways or steamers, or with other modes of rapid communication, the bulletins can be utilized in a corresponding manner. If, at the stations nearest to persons interested, as for instance, the Board of Trade, or Chamber of Commerce, or the Meteorological Committee of an Agricultural Society, or individuals interesting themselves in the study of practical meteorology, no newspaper prints the bulletins furnished gratuitously for that purpose, there is a strong probability that, upon proper application made to the editors or proprietors, they would be printed as of interest to the subscribers and readers. In cases where delay would thereby be avoided, arrangements can often be made with the publisher, to have copies of the newspapers containing bulletins, sent in advance of its delivery by mail. By such means and others which will suggest themselves, a record of meteorological conditions elsewhere can be obtained in many places within so few hours after the observations are taken at the different stations, as to enable a student to make for himself many important deductions. The accuracy of these would be greatly assisted by local observations made at the same time, with similar instruments, and by frequent local observations made during any time at which there is especial interest or anxiety as to the probable weather.

The navigator, the agriculturist, or the student, can supplement in this way by the readings of his own instruments and his local knowledge, the reports and information

furnished by the United States, and is fitted to arrive at intelligent conclusions as to the data before him.

To facilitate the study of the bulletin, its information may be easily transferred on blank charts of the United States, which can be obtained from the office of the Chief Signal Officer, at Washington, D. C., at actual cost (\$2.75 per hundred), and which will be sent by mail, free of other expense, to applicants. These graphic charts are of additional value from the fact that it is often possible to trace upon them, in lines, the progress of storms, or the change of meteoric condition, (as movement of an area of light or low barometer,) from report to report, and thus by considering the past, and by applying laws and generalizations reasonably well established, to estimate more easily the "probabilities" of the future.

Since October 30th, 1871, at lake or sea ports, besides the publication of the different bulletins, etc., warning or cautionary signals are displayed, if by information had at the central office in Washington, a probability of stormy or dangerous weather has been deduced for that port or place or in that vicinity, and that the danger appears to be so great as to demand precaution on the part of seamen or others interested. These signals consist of the hoisting of a red flag with black square in its center by day, and a red lantern by night; each signal is required to be ordered by telegraph from the office at Washington, and remains displayed until it is ordered down by the same authority.

At stations situated on our larger rivers, the stage of the water, its rise or fall, during twenty-four hours, is observed and reported once daily and published with the afternoon bulletins for the guidance of river men.

In addition to their value as weather intelligence the observations of the Signal Service have or will have importance as permanent records for future reference and study, for it is only possible after a greater elapse of time, by comparison between the observations of different years, to come to a conclusion as to the correctness of the laws governing meteoric changes of a climate already established, and also,

to discover or deduce therefrom, as the science advances, new and heretofore unknown laws; therefore all the observations are carefully entered in books for that purpose, which, after completion, are collected at the Chief Signal office. The readings of the different instruments during a month are also separately located on a blank chart, prepared and issued at Washington; the different points thus fixed are joined by lines, which present to the eye undulations corresponding to motions of the several instruments. The chart is a marvel of brevity, clearness and ingenuity, and illustrates beautifully the meteorological laws. I am convinced, that photographic copies of these maps, as prepared from observations taken at Indianapolis and perhaps St. Louis, Chicago, Louisville and Cincinnati, filed at the Chief Signal Office, would be a valuable addition to the library of the State Agricultural Society.

At all stations, meteoric and auroral display, earthquakes and unusual atmospheric appearances and disturbances, especially characteristic phenomena of every serious storm passing over or near the station are carefully observed and recorded.

On high mountains and by balloon ascensions observations have been made in the higher ærial currents, as of especial value in relation to some of the duties of practical meteorology, and wherever an opportunity offered itself by exploring parties or expeditions, observations have been made at distant points, or those of the meteorology of which little is known. With this view an observer was detailed to accompany the North Pole Expedition under command of Captain C. F. Hall.

At the commencement of the service it was expressed in the resolution of Congress, that a direct benefit from it would be had only for commerce and especially for navigation, but the general expectation of agriculturists, that in some way, the duties of the service in reference to the approach of storms or sudden atmospheric changes, would be made to their interest, has frequently found expression. It is evident that the observations which involve particulars



regarding heat, moisture, wind, rain, clouds, etc., could be made directly useful to agriculture, since after sufficient notice, the operations of the farm might be frequently so arranged as to avoid the serious losses occasioned by storms or sudden changes of temperature, by hail or rain. This would require an increase of stations in each of the agricultural States, but it is obvious that with the limited appropriation at present, it is impossible to establish meteorological stations at all the points where, with increasing facilities, observations could be made and the reports of others directly received with advantage to the interest of agriculture. The present system is, however, so far complete as to be indirectly useful to the agriculture; bulletins being published already at more than fifty stations located in all parts of the country and deductions therefrom in all the newspapers of principal cities; by taking advantage of these publications intelligent farmers can make their own forecasts, as heretofore suggested, and they will in time become better judges of the probable weather than they have been able to be at any time previous to the issue of such reports.

The limited time, and number of observations so far taken regularly at this station, will not permit to come to a correct conclusion regarding any probable peculiarities of the climate of Indiana, but it is certain that the sudden and frequent changes of temperature from a higher to a lower, especially so near the end of summer, and from a lower temperature to a higher, frequently so during spring, must strike even a casual observer. These sudden changes have also often been observed during the summer and winter months. In comparing the monthly mean temperature as noted in the table annexed hereto, it is very striking how the mean temperature increases monthly nearly  $10^{\circ}$  until June 1871, remains stationary in June, July and August of that year, decreases again till December, remains nearly stationary during December, 1871, and January and February, 1872, then it increases again by nearly  $10^{\circ}$  till June and remains stationary during June, July and August, 1872. This regularity of decrease or increase of  $10^{\circ}$  during the spring and fall months is only

interrupted by a difference of the means of October and November, 1871, and March and April, 1872, when it amounts to  $20^{\circ}$  or double the difference of the other months, and thereby indicating the sudden change of the summer temperature to that of winter, and from winter to summer.

The humidity or the change of amount of vapor in the air, seems to follow here different laws from that at places near the sea. There the amount of vapor present in the air is least during the night, and greater during the day, while here it has been invariably observed to be greater during the night and early morning, then it decreases steadily and gradual until 1 P. M., remains stationary until about 4 P. M., and then increases again. The regularity of this change has only been interrupted when a heavier rain prevailed during the day.

The greatest amount of rain during one month fell in the months of July in 1871, as well as in 1872. The amount in the former was 5 inches, while in the latter it was more than double that amount, or 10.59. The least amount of rain fell in May and September, 1871, and January and March, 1872, and by all appearances so far, the total amount of rainfall of September, 1872, will be hardly more than that of September, 1871.

Local indications of rain seem to be, in winter and fall increasing haziness from day to day, and within about 12 hours before commencement of rain the appearance of a low bank of clouds, seeming to rest on the horizon and extending from southwest to northwest. During these seasons light rains commence frequently with a southeast wind, the wind changing gradually to south and southwest with increasing rain, the wind remaining for sometime steadily in the southwest veers to west occasionally, rain still continuing, and then to northwest with increasing velocity; clearing up weather and falling temperature; very seldom the rain continued after the wind had changed to the northwest, and then only for a short time. Here the barometer will indicate, by rising suddenly, the change of the wind from southwest to northwest, and consequently clearing weather, as I

have frequently observed at sea or on the coast; here the barometer begins to rise only after such a change has really taken place, and often remained low as long as cloudy weather prevailed with a northwest wind, and commenced to rise then only when the nimbus or stratus clouds took the form of cumulus clouds. After that an extraordinary rise of the barometer will indicate a certain change of the wind to north and northeast. During the summer and latter part of spring the local indications of coming rain and circumstances under which rain will fall are quite different. While the rain in winter is more continuous, in summer and spring it falls only in squalls of shorter duration, preceded by stronger winds and followed by variable light winds and calms. Previous to rain, generally in summer, a dense sheet of stratus like clouds will extend from the west far above the, from the westward, rapidly moving, well-defined cumulus clouds. Soon after these clouds will assume the cumulus nimbus form (thunderheads.) The wind steadily from west will increase to brisk, or, for a short time, even high. Distant lightning will make its appearance followed by nearer approach of the cloud, by distant thunder, and rain begins to fall very soon, and then the wind will diminish in force and become variable from southwest to northwest, and sometimes, after passage of squall, light to north and east.

A steady, continuous rain, lasting several days or even twenty-four hours, as often, at certain seasons, is the case in more southern places or the sea coast, has never prevailed here, since I have been at Indianapolis. Even what seemed to be continuous rains, have been interrupted for an hour or more by total cessation of rainfall.

The velocity of the wind over this station has followed a very regular law; during night and morning, with but few exceptions, the wind has been very light, increased in strength during the day and diminished toward evening. Prevailing winds have been mostly from southwest decidedly so during summer, and only during the winter months the wind seemed to prevail sometime from northeast. The force of wind has not exceeded that of brisk or high, with exception

of a very few times where the wind reached, and then only for a few minutes the velocity of a gale (velocity above 40 miles.)

Permit me to remind you, sir, that the above remarks regarding local atmospheric observations, can only be admitted as suggestions based on a limited number of observations, and that their correctness and reliance can be only corroborated by a greater lapse of time bringing with it more numerous repetitions of these meteoric phenomena at the different seasons.

Hereto annexed I have the honor to submit tables showing the daily and monthly means of the thermometer and barometer, monthly amount of rain, most prevailing winds, and monthly velocity of wind, as deduced from observations taken at Indianapolis, Indiana, from March 1, 1871, to August 31, 1872.

Very respectfully, Sir,

Your obedient servant,

C. F. R. WAPPENHAUS,

Observer, Signal Service U. S. Army.

TABLE

Showing the daily and monthly mean of Thermometer, at Indianapolis, Indiana, from February 10th, 1871, to August 31st, 1872.

DATE.	1871.												1872.							
	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	
1		48 46 87	87 77	80 61	59 44	27	38 17	31 40	58	65	86	75								
2		60 55 50	78 77	83	76 46	5	40 11	33 51	4	14	84	69								
3		34 53 47	70 87	74 72	47 56	3	30 32	48 5	0	79	68									
4		41 67 57	82 77	87 67	50 7	1	27 41			70	71									
5		40 65 47	77 80	77 78	68 40	10	31 21	87 17		72	74									
6		41 64 47	73 78	78 73	62 45	13	32 20	28 54		77	75	74								
7		54 72 56	72 80	79 74	50 40	16	38 10	102 73		75	78	78								
8		63 77 59	73 87	78 77	1 5	8	24 41	61 7		74	77	61								
9		47 66 64	75 79	85 74	0	2	30 14	174 71		83	83									
10		21 50 66	77 77	80 81	6 5	1	34 11	147 87		79	80									
11		24 42 45	70 74	78 104	24	5	33 52	8 1		86	80									
12		29 42 51	66 78	74 74	3 4	3	34 14	14 8		80	78									
13		25 47 55	70 77	84 87	71 5	0	32 24	44 5		83	78									
14		27 59 52	70 72	82 85	74 7	40	24 26	5 14		83	77									
15		42 67 50	75 72	80 85	58 4	5	23 12	10 14		77	73									
16		38 56 53	74 77	77 74	41 1	13	18 10	10 14		77	75									
17		42 47 61	68 77	77 71	64 3	17	28 5	54 15		75	79									
18		31 71 59	74 71	70 72	77 4	11	24 15	48 11		79	80									
19		41 61 62	73 77	75 71	74 4	4	1 15	53 11		81	80									
20		46 51 55	74 74	67 70	72 2	3	1 1	84 70		84	84									
21		57 48 47	71 73	67 71	63 2	1	25 20	48 78		73	85									
22		39 54 47	77 76	75 74	74 74	22	30 11	14 74		81										
23		50 35 51	83 78	77 68	74 15	40	17 47	1 54		84										
24		55 39 54	77 81	70 77	5 4	5	13 13	38 15		71	77	79								
25		40 40 63	77 76	73 71	66 4	17	13 44	9 6		77	87									
26		39 41 71	78 71	51 57	43 1	21	1 28	87 78		82										
27		32 39 57	70 77	71 70	50 3	16	24 34	7 74		77										
28		47 39 59	77 74	44 41	18	1	2 50	7 77		72										
29		47 59 41	63 71	67 67	63	2	14 20	81 70												
30		48 63 74	60 77	74 50	10	8	12 43	75 60		79	62									
31		46 79	79 66	58 43	1	40	1	75 62												

Monthly mean of Thermometer.

48	58	66	76	75	76	63	58	39	28	26	30	35	55	64	74	78	76
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## TABLE

*Showing the daily and monthly mean of Barometer, at Indianapolis, Indiana, from February 10, 1871, to December 31, 1871.*

DATE.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1.....		29.908	29.761	29.763	29.981	29.962	29.923	30.198	30.244	30.110	30.290
2.....		29.662	29.603	29.737	29.953	30.016	29.986	30.250	29.951	30.123	30.111
3.....		30.015	29.826	29.642	29.994	29.840	29.965	30.176	29.864	30.062	29.811
4.....		30.072	29.942	29.709	29.938	29.855	29.832	30.053	29.830	29.907	30.261
5.....		29.992	29.797	29.866	29.843	29.954	29.861	29.928	29.814	30.065	30.383
6.....		30.178	29.746	29.983	29.734	29.828	29.950	29.913	30.035	30.217	29.805
7.....		29.741	29.764	29.930	29.871	29.953	29.883	30.090	30.132	30.184	29.961
8.....		29.530	29.848	29.923	29.989	29.938	29.905	30.111	30.119	29.861	30.258
9.....		29.717	29.972	29.985	30.055	29.978	29.993	30.157	29.934	29.563	30.256
10.....	30.149	29.966	29.568	30.076	29.936	29.860	29.912	30.231	29.974	30.047	30.199
11.....	30.254	29.881	29.731	29.936	29.754	29.783	29.940	30.238	30.064	30.399	30.071
12.....	30.030	29.897	29.838	29.853	29.829	29.915	29.974	30.212	30.156	30.300	29.823
13.....	30.130	29.964	29.745	29.967	29.816	29.912	29.910	30.147	30.175	29.783	30.113
14.....	30.157	29.778	29.715	29.968	29.957	29.947	29.935	30.047	29.933	29.753	30.253
15.....	29.880	29.768	29.841	29.864	30.021	29.964	29.944	30.026	30.209	30.173	29.967
16.....	30.131	29.714	29.982	29.780	29.965	29.801	30.001	30.065	30.225	30.241	29.982
17.....	29.433	30.002	29.925	29.975	29.772	29.899	30.079	30.150	30.141	30.291	30.130
18.....	29.779	30.028	29.630	30.120	29.923	29.761	29.997	30.005	30.303	30.130	30.334
19.....	29.911	29.887	29.412	36.057	29.896	29.860	29.949	29.951	30.082	30.061	30.142
20.....	29.892	29.803	29.661	30.023	29.973	30.031	29.866	30.110	30.214	30.207	30.251
21.....	30.151	29.769	29.888	29.924	30.086	30.074	30.005	30.246	30.156	30.025	30.240
22.....	30.086	29.641	30.155	29.994	29.974	30.168	30.057	30.045	30.137	29.978	29.917
23.....	29.897	30.117	30.143	30.067	29.800	30.181	30.058	29.944	29.983	29.832	29.947
24.....	29.815	30.290	30.193	30.049	29.847	30.089	29.996	29.954	29.970	29.985	30.016
25.....	29.877	30.113	29.988	30.057	30.019	29.978	29.880	29.916	29.933	30.025	30.096
26.....	29.609	29.684	29.669	30.107	30.008	29.949	29.812	29.982	30.010	29.907	30.148
27.....	30.082	29.958	29.639	30.036	29.875	29.988	29.873	30.014	29.900	30.065	30.594
28.....	29.904	30.157	29.760	29.985	29.853	30.061	29.670	30.166	30.090	29.979	30.314
29.....		29.983	29.719	29.914	29.985	30.087	29.865	30.448	30.133	30.341	30.046
30.....		29.954	29.680	29.950	29.943	30.053	29.842	30.408	30.130	30.359	29.814
31.....		29.918		29.939		29.957	30.078		29.814		30.042

*Monthly mean of Barometer.*

.....	29.906	29.801	29.941	29.851	29.957	29.923	30.165	30.053	30.065	30.111
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Barometer corrected for temperature and elevation.

## TABLE

*Showing daily and monthly mean of Barometer from January, 1st to August 31st, 1872.*

DATE.	January.	February.	March.	April.	May.	June.	July.	August.
1 .....	30.429	30.269	30.095	30.165	29.965	29.992	30.034	29.971
2 .....	30.088	30.189	30.022	30.128	30.190	29.923	29.994	30.004
3 .....	30.073	30.027	29.915	30.142	30.083	29.892	29.891	30.089
4 .....	30.281	29.986	30.132	30.254	30.304	30.031	29.929	30.175
5 .....	30.135	30.077	30.315	30.024	30.231	30.012	30.079	30.175
6 .....	30.267	30.485	30.409	29.582	30.185	29.815	30.090	30.136
7 .....	30.191	30.480	30.202	29.591	30.129	29.671	30.079	30.104
8 .....	30.326	30.214	29.648	29.448	30.052	29.802	30.046	30.062
9 .....	30.399	30.006	29.665	29.730	29.995	29.800	29.988	30.005
10 .....	30.183	29.851	29.862	30.058	29.895	29.929	30.005	29.963
11 .....	30.019	29.883	30.102	29.918	29.943	30.009	29.956	29.966
12 .....	29.967	29.776	30.230	29.971	30.074	30.007	29.939	29.957
13 .....	30.146	29.840	29.981	30.234	30.066	29.809	29.955	29.899
14 .....	30.368	30.046	30.091	30.091	30.078	29.868	29.871	29.929
15 .....	29.901	29.925	30.342	29.861	30.074	29.959	29.759	30.039
16 .....	30.227	29.691	30.060	30.259	29.978	30.004	29.780	29.993
17 .....	30.326	29.902	29.932	29.931	29.694	30.115	29.895	30.008
18 .....	30.041	30.039	29.742	29.665	29.484	30.099	30.025	30.073
19 .....	29.679	30.100	30.140	29.795	29.628	30.077	30.078	30.150
20 .....	29.981	30.012	30.503	29.769	29.848	30.124	29.894	30.166
21 .....	30.108	29.978	30.077	30.039	29.919	30.194	29.886	30.120
22 .....	29.742	29.985	30.000	30.263	29.767	30.106	30.014	30.063
23 .....	29.975	29.634	30.030	30.024	29.889	29.984	29.897	30.044
24 .....	30.342	29.562	30.118	29.988	29.817	29.905	30.029	29.903
25 .....	30.135	30.113	29.931	29.959	29.967	29.941	29.960	29.937
26 .....	29.778	30.175	30.200	30.007	29.949	29.959	29.973	29.975
27 .....	29.717	30.109	30.125	30.052	29.917	29.957	30.004	30.007
28 .....	29.970	29.955	29.973	30.087	30.067	30.061	30.007	29.902
29 .....	30.440	29.966	29.903	29.946	30.060	30.111	30.083	29.905
30 .....	30.438	.....	29.580	29.834	30.197	30.065	29.964	30.123
31 .....	30.885	.....	29.713	.....	30.239	.....	29.928	30.166

*Monthly mean of Barometer.*

	30.130	30.008	30.043	29.960	29.988	29.976	29.964	30.032
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Barometer corrected for temperature and elevation.

## TABLE

*Showing total amount of, rain, prevailing direction of wind and velocity of wind per month from March, 1871 to August, 1872.*

MONTH.	Total amount of rainfall.	Prevailing wind.	Total No. of miles.
<b>1871.</b>			
March .....	3.93 inch.....	S. E.....	.....
April .....	1.87 " .....	S. W.....	6053
May .....	1.59 " .....	N. E.....	4039
June .....	2.51 " .....	S. W.....	3238
July .....	5.00 " .....	S. W.....	2779
August .....	3.69 " .....	S. W.....	2358
September .....	0.89 " .....	N. E.....	2650
October .....	1.54 " .....	S. W. and S. E...	4152
November.....	3.52 " .....	N. W.....	3659
December .....	2.39 " .....	S. W. and W.....	4800
<b>- 1872.</b>			
January .....	1.17 " .....	S. W.....	5325
February .....	1.41 " .....	N. E.....	3867
March .....	1.31 " .....	N. W.....	4886
April .....	3.26 " .....	S. E. and S. W...	5461
May.....	3.22 " .....	W.....	4912
June.....	3.28 " .....	S. W.....	3852
July .....	10.95 " .....	S. W.....	3329
August.....	2.69 " .....	S. W.....	3267



## PROGRESS OF MANUFACTURES IN THE STATE.

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The importance of the various mechanical industries of the State, and their inseparable connection with our Agricultural interests, demand that the subject should have an especial, if not a conspicuous notice in this volume, and we only regret that our more specific engagements have so occupied our time, that we have been prevented giving that early attention to this department of our State prosperity which its intrinsic interests and public utility, in our view, call for at our hands.

The fact will be admitted, that our great agricultural success and prosperity are largely attributable to the mechanical skill of the country; and to the inventions in this line and their developments by the genuine industries of our mechanics may, doubtless, also be traced the chief cause of our general advancement as a State.

The ring of his hammer always tells of the mechanics' creative power, and the products of his hand furnish to others, facilities ingenious and labor saving, which afford the means of livelihood and wealth to unnumbered thousands.

The mechanic, indeed, stands at the head of our productive prosperity, and to him, more than to any other, the commonwealth must look for its most distinguished prosperity.

Though possessing within her boundaries the richest soil of the west, our State cannot expect to secure her highest *acme* by relying on her agriculture alone.

It is this conviction which now leads us, in this connection, to look over the territory of the State and among our

numerous growing cities for the evidences of our mechanical prosperity.

#### INDIANAPOLIS.

The rapid and unparalleled growth of our capital city, which has been the astonishment of so many, may not, as some suppose, be traced alone to its grand railroad facilities. Its chief glory, it is true, may be found in its superior locomotive advantages, but its numerous and growing mechanical establishments have done much to increase her population—to build up her general and wholesale trade, and to give her the character and distinction of a metropolitan city.

No place can count on any permanent city prosperity without population, and this fact appears to have been prominent in the understandings of the leading citizens of Indianapolis, and they have, therefore, offered large inducements to parties to locate among them for manufacturing purposes. Under such liberal encouragements she is rapidly numbering among her other facilities, manufacturing establishments of almost every mechanical variety.

Her rolling mill equals that of any other in the United States, being large in capacity and wonderful in power, and able to turn out railroad iron of a superior quality at a rate which, but a few years ago, would have seemed almost miraculous.

The machine works of Greenleaf & Co., Sinker, Davis & Co., and the Eagle Works, are well known among the most prominent manufacturing specialties of the State. The Sheffield Saw Works, of E. C. Atkins & Co., with the extensive foundry establishment, of Delos Root & Co., and the mammoth cabinet manufactory of Spiegel & Thoms, are also distinguished for their mechanical skill and progress.

The Woodburn Sarven Wheel Company's Works, the car wheel establishment, of Nash, John & Co., the Glass Works, and the extensive Wheeler & Wilson Sewing Machine Manufactory, are each, in their respective departments, adding largely to the mechanical vitality of both the city and State.

The Capitol Tobacco Works, of Madden & Co., stands at the head of its class of manufactories in the city, while there are many others which might be named if our space allowed of it, but we are compelled in an article of this character to economize, and to speak only of such as are leading features over the State.

#### CONNERSVILLE.

The Patent Force Blast Rotary Blower, manufactured by P. H. & F. M. Roots, of Connersville, has attracted large attention both in Europe and America. It is in itself a wonderful invention, and may be set down as an advance in mechanical discovery of the very first magnitude. The Messrs. Roots have turned out a mammoth blower for the great pneumatic railroad of New York City, which might be styled the Leviathan blower of the world.

#### NEW ALBANY.

In the manufacturing line, this Indiana city of the Falls maintains a distinguished prominence. The extensive glass works of John B. Ford & Co., the railroad rolling mill of J. Bragdon & Co., the nail works, the ax and edge tool works, with their Ohio Falls Forge Works, and their woolen and cotton factories, all of which are extensive, and give to that flourishing city the highest character of mechanical skill and energy. When the St. Louis Air Line R. R. is completed, this city will have free access to the coal fields of the State, which will enable them to more than double their present manufacturing facilities.

#### JEFFERSONVILLE.

The car works of this city are the most extensive of any in the State, while the mechanical products of our southern prison, like that of the north, are far beyond what most persons would suppose.

## RICHMOND.

In the manufacture of threshers, portable engines, circular saw mills, plows, and portable grist mills, the city of Richmond, perhaps, takes the lead. The mechanical enterprise of many of her citizens is certainly deserving of the highest commendation, and we take great pleasure in thus speaking of their mechanical skill and prosperity.

## SOUTH BEND.

Though lying away out on the northern borders of the State, the city of South Bend can lay claim to a mechanical progress equal to any place, of the same population, perhaps in the West.

The Singer Sewing Machine Manufactory employs four hundred hands. The Studebaker Wagon and Carriage Factory four hundred hands. Birdsall's Clover Huller, the best patent in the United States, is made here. The Strayer Drill Manufactory is extensive; they have in operation also two large paper mills and several iron manufactories, besides cabinet, woolen and other establishments.

## MISHAWAKA.

This is another northern city of eminent mechanical enterprise. Their leading features are the church and school furniture of Andrews & Co., a large establishment, the Wilburn Wagon Factory, which turns out some one hundred and forty wagons per week; the Mishawaka Cabinet Manufactory, the St. Joseph Iron Works, the general cabinet works of the Martin Brothers, and a similar establishment of Toshbaugh Castillo, all of which are doing a large business. The energy displayed in manufacturing in this city is an honor to the State.

## ELKHART.

The Lake Shore Machine Shops, of this place, are of the

most extensive character and the prospects are that when their hydraulic works are completed they will have facilities of manufacture of almost unlimited capacity.

#### EVANSVILLE.

In connection with her numerous other enterprises this flourishing city of the "Pocket" is giving large attention to her manufacturing interests. They have an extensive rolling mill, a number of large foundries, cabinet, carriage, wagon and plow factories, besides cotton mills, stove and hollow ware manufactories. They have also several very extensive ship yards which turn out some twenty steamboats per annum. The city of Evansville can afford to put much of her wealth in manufactures as she must have open to her trade in the future the best markets of the world.

#### PERU.

Among the growing cities of the northern part of the State, that of Peru is even at present maintaining a distinguished position. Though not so extensive in her manufactories, she can boast at least of having two of the largest in the State.

The mammoth establishment of the Howe Sewing Machine Manufactory is its chief specialty. Built in 1870, and destroyed by fire in 1871, it was rebuilt and in operation again in sixty days. They employ five hundred men, and turn out from three hundred to four hundred complete tables per day, besides shipping an immense amount of wood work to the East. The vast power of this establishment is indicated in the sales alone of their Indianapolis office, which, we learn, run up to two thousand machines per month. The mechanical progress of sewing machines alone would honor our State, if we had nothing else to boast of.

This city has also one of the most complete and extensive woolen factories. In the manufacture of superior cloths and blankets, it excels any other in the State. The pro-

prietors certainly merit the commendation of the general public for their bold enterprise, as well as for their mechanical skill.

#### ANDERSON.

Though not quite so pretentious as some other places, this little city is developing very considerable mechanical enterprise. They have now in vigorous operation two hub and spoke factories, two stave and head factories, two large planing mills, one large chair factory, one furniture factory and a large foundry and machine shop. They are now perfecting their hydraulic works, which, when completed, will give them a fall of forty-four feet, and furnish the finest of manufacturing facilities.

#### BRAZIL.

Standing at the present head of our vast coal fields, this growing place possesses advantages in the furnace and forge lines over most of the other towns in the State. They have now some four or five blast furnaces in operation, which are turning out heavy amounts of iron, all of which may, no doubt, be set down as only "the beginning of the end" of a much more extensive mechanical enterprise.

#### TERRE HAUTE.

The Prairie City also comes in for a respectable share of the mechanical enterprise of the State. Their nail factory, their machine shops and their mills, constitute only a portion of their mechanical enterprise. The coming years will, doubtless, add greatly to their mechanical prestige, and in these regards place the city among the foremost in the State.

#### LAFAYETTE.

A word may be said of this beautiful city. In the mechanical line it may not be written that they excel, but still they

have a number of manufacturing establishments both of character and enterprise, and mechanical genius is by no means under par among them. They are working, we learn, to the establishment of quite a number of manufacturing enterprises.

#### MADISON!

It would seem wrong to ignore the city of Madison in even a brief review of the mechanical progress of the State. An old town and the birth home of many of the best business men of the State, their present manufacturing enterprises are far from what they should have been, still there is a large amount of manufacturing of various kinds done in the place. It is to be feared, however, that her loss in the emigration of many of her citizens will prove her misfortune, even for many years to come:

#### LAWRENCEBURGH.

Though the city is subject to inundations in seasons of high waters, the German element of its population have built up several large furniture establishments, which are doing much to preserve the prosperity of the city and to create a very large trade. They have also a large woolen mill here, fitted up with superior machinery, but at present, we believe, it is not in operation.

#### FORT WAYNE.

This large and growing city of our State is by no means neglecting its manufacturing interests. They have extensive car works, a large machine shop, founderies, woolen factory, planing and flouring mills, and many other mechanical establishments, which are doing much to build up their manufacturing prosperity and to give life and progress to their prosperous city.

## GREENCASTLE.

The Greencastle Iron Works and Nail Factory have grown to be a State specialty. The business of this establishment is conducted with prudence and energy and some one hundred and fifty hands find employment in their service. There are some other manufacturing establishments in this place but there is evidently room for more.

## CANNELTON.

The extensive cotton mill of this Ohio river town, though not so generally known to the State, is no ordinary manufacturing specialty. Giving employment to five hundred hands their products are large as well as substantial. They have also a large paper mill, besides flouring mills, and a very extensive tile factory. For a town of only three thousand inhabitants, Cannelton makes a good show in the manufacturing line. Its coal advantages should give it great prosperity.

## GENERAL REMARKS.

It may be justly remarked that a large portion of the manufacturing enterprises of the State are of recent establishment. Our coal and railroad developments have given an impetus to trade and enterprise and opened up the way of manufactories all over the State. Keeping pace with our agricultural advancement, the mechanical genius of the country is rapidly rising to a position of resource and accomplishments which already reflect well on the prosperity of the State, and indeed, we may say, the whole country we live in.

Our most intelligent citizens see that our manufactories must be patronized and encouraged, for in their success lies much of the general prosperity of the country and to their vital advancement must we look for much of that permanent healthfulness which alone can give honor and prosperity to us as a people.



## CONDITION OF AGRICULTURE. 1872.

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It is a pleasant duty to record the past season as one of abundance and prosperity. We have been bountifully "blessed in the field," and truly can say, have enough and to spare.

The cold weather of the winter of 1871-72 was unusually long and severe, the frost penetrating the ground to a greater depth than for many years past. The spring opened gradually, without heavy rains, and the frost was slowly withdrawn from the ground, leaving it mellow and in good condition for breaking, planting and subsequent cultivation. The deep frost had destroyed to a great extent the germs of insects injurious to vegetation, and moderate and seasonable rains rendered the growing season unusually propitious to the production of most bountiful crops, of every description.

The heat of the summer was greater than usual, and copious and frequent rains at the time of wheat harvest, gave rise to apprehensions of damage to the grain in the shock, but fortunately it escaped with little injury, while the rains came at a season that made the corn crop a remarkable one.

Concerning disease among farm stock, it may be stated that, while in some parts of the State, cattle have been affected by something of the nature of the Texas cattle fever, and horses to a limited extent by the prevailing epidemic, the hog cholera is fast disappearing, and the healthfulness of stock generally, may be considered as equal to if not above the average of past years.

The condition of crops in the State is taken from the monthly reports of the Department of Agriculture.

These reports are made up from a systematized correspondence with agents in the several counties, from which the loss or gain is estimated by percentage, taking 100 as the average.

Nine years of experience and careful study, have proven these estimates to be as nearly accurate as could be obtained within the season in which the crops are produced.

Concerning corn, the returns from forty-seven counties show that twelve produced an average crop, twenty-five over an average, and ten under an average.

Five counties, viz : Marion, Wayne, Bartholomew, Shelby and Madison report an estimate of over a million bushels each.

The product of the State is estimated at 5 per cent. above the average.

The following tables will show the estimated condition of the principal products for the past year :

	Product, compared with 1871.	Average quality, compared with 1872.
Wheat .....	101	100
Rye.....	97	101
Oats.....	111	98
Barley .....	92	97

CONDITION OCTOBER 1ST, 1872.

One hundred being taken as the average.

Buckwheat.....	88
Corn .....	110
Potatoes, Irish.....	95
Potatoes, Sweet.....	96
Tobacco.....	97
Beans.....	100
Sorghum .....	94
Hay, product compared with 1871.....	99

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Hay, average condition of Timothy.....	97
Hay, product of all kinds, compared with 1871.....	100
Apples, average condition September 1st.....	102
Grapes, average condition September 1st.....	104
Peaches, product compared with 1871.....	105

These estimates are made up from the returns from forty-six counties, and may be taken as the average for the whole State.

We give the returns of *Crop Statistics* from counties, in the report from the Agricultural Societies, in answer to questions addressed to them. The limited number of reports received in time, prevents making a *full report* by tabular statement.



REPORTS  
OF  
COUNTY AND DISTRICT  
AGRICULTURAL SOCIETIES,  
FOR THE YEAR 1872.

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BRIDGETON UNION,

Composed of the counties of Parke, Putnam and Vigo.

A beardless, white chaff, Alabama wheat is the most popular variety. In the south part of the county a few have a variety of what they call Lancaster county, Pennsylvania, Improved Mediterranean; grain plump, clear, bright; bran thin.

In the north, a bearded variety called Swamp wheat, yield from 10 to 15 bushels per acre, greatest 27 bushels per acre. Seed per acre, drill,  $1\frac{1}{4}$ ; broadcast,  $1\frac{1}{2}$  bushels. Price per bushel, since harvest, \$1.10@1.30, within the year, \$1.60. Harvested principally by machinery. Have no sure preventive of Hessian fly; not any weevil in the county for a number of years.

A 12 to 16 rowed white corn (no other name), is the popular variety on clay ground; on the bottom lands a large, yellow is the favorite kind. The yield on bottom lands is from 60 to 75 bushels per acre; on the upland, from 20 to 50. Of course a 20 bushel crop is on wet land, badly farmed. The average crop is from 40 to 45 bushels per acre; cost of production about 40 cents per bushel in crib; average price in the county 40 cents per bushel.

OATS.— $1\frac{1}{2}$  to 2 bushels of seed sown per acre average per acre 30 bushels; average price per bushel, 35 cents.

RYE.—1 bushel of seed per acre; but very little cultivated.

BARLEY.— $1\frac{1}{2}$  to 2 bushels of seed per acre; but little cultivated.

Timothy, red top and red clover are the principal grasses of the county. Seed per acre, 6 pounds of timothy and 8 pounds of clover. As farmed at present the average per acre is about one ton; price from \$12@15.

We have no dairy, strictly speaking, in the county. -  
ter the past year ranged from  $12\frac{1}{2}$ @30 cents per pound; average 20 cents.

I do not know of a herd of thoroughbred cattle in the county. Grade short horns are mostly aimed at; three year old steers from \$35@37; milch cows from \$40@50.

Large breeds of sheep are considered the most profitable. Wool growing would be profitable if there were not so many sheep killed by dogs; as it is, there is no encouragement to handle them.

Berkshire, Chester White hogs and what is called the Magee stock, are the most popular.

Early Rose and Early Goodrich potatoes are the choice for early planting. Peachblows and Shaker Russet for winter use. The Peerless gives good satisfaction as far as tested, and if they prove as good in quality as the Peachblow, they will supercede them as a late crop. Plant in hills, manure with chips, forest leaves, wood ashes and old stable manure enough to hasten the rotting of the mass. The tillage is seldom more than three plowings, with double

shovel plow, with good hilling at last plowing. Average yield, 100 bushels per acre; cost of production about 40 cents per bushel; average price, 50 cents.

The interest in fruit culture is steadily on the increase.

#### SOIL, TIMBER, ETC.

The uplands are a tenacious clay, with a hard clay subsoil, ten to twenty-five feet of the surface is of the boulder drift, or late glacial deposits, according to Agassie, it often rests on the earlier drift, called hard pan.

The bottom lands are rich alluvials, kept good by annual overflow. Doubtless, grass, grazing and the dairy, is what the upland of the county is best adapted for, yet grain raising is the chief pursuit.

The different kinds of timber are oak, sugar, walnut, hickory, poplar, beech, ash, buckeye, hackberry, maple, sycamore, linn, cottonwood, birch and elm. But very little done in the way of reclaiming wet land by ditching, but what has been done has given good satisfaction. No marked improvements; yet a steady advance both in farming and in the use of machinery. There has been considerable improvements in stock in the last two or three years, especially in horses, cattle and hogs.

There is a fine blast furnace in operation in the county, producing on an average of one hundred tons of pig iron per day, when all in full blast. The average shipment of coal per month for the county, is about sixty thousand tons.

The fair was held at Bridgeton, a small village in the southeast part of Parke county, commencing August 26th, and closing the 31st, 1872.

The society has been steadily on the increase for the last five years. We paid our premiums in full this year for the first time since the first fair. Our third fair, owing to the rebellion and bad weather, we only paid fifteen cents on the dollar. This year the weather was very unfavorable, until the fourth day; yet the fair, financially, was a success. The entries in stock were about the same as last year, but owing

to the excessive rain on the third day, the halls were not as well filled as they would have been. The entries of horses and hogs was large, and the show very fine.

The amount of premiums awarded, \$1,927.50. Total number of entries, 828.

#### RECEIPTS.

From old fund.....	\$ 117 13
Membership and gate fees.....	2,080 91
Shows, swings and refreshment stands.	470 40
Ten per cent. on time ring.....	97 50
Total .....	<u>\$2,765 94</u>

#### EXPENDITURES.

Expenses of Fair, repairs, etc.....	\$ 648 63
Paid on premiums.....	1,927 50
	<u>2,576 13</u>
Leaving a balance of.....	\$189 81

D. SEYLOLD,  
Secretary.

### DUBOIS COUNTY.

This Society was organized in the year 1871, and held its first Fair from October 15th to 19th, 1872, inclusive. The attendance was very large; the entries comparatively small, our farmers and mechanics taking very small interest in the way of an agricultural and mechanical point of view, they taking the Fair more for a show or a place of amusement, as goes to prove that nearly all the premiums awarded in live stock went to neighboring counties, and but very few second premiums were gained for the simple reason of having no competitors. The amount of premiums offered was \$1,200, and only \$700 awarded, a great many classes being left entirely open. Nevertheless the Fair has had its good



effects, and has awakened a lively interest as to the true intent of the Society.

The receipts and expenditures have been as follows:

RECEIPTS.

Received for entries, rents of stands and stalls,  
and sale of tickets..... \$1,402 35

EXPENDITURES.

Paid out for premiums..... \$700 00  
Expenses of Fair ..... 300 00  
\_\_\_\_\_ 1,000 00

Leaving balance on hand..... \$402 35

Amount paid to Treasurer, on account  
of capital stock..... \$2,800 00

Expended in fitting the grounds and  
buildings ..... 2,500 00

Leaving a balance..... 300 00

Amount due on capital stock..... 2,200 00  
\_\_\_\_\_

Leaving a total balance of..... \$2,902 35

Purchase-money on the grounds, not yet paid by the Society, due in two years, \$12.00.

Total number of entries made, 286; mostly table comforts, and only five entries were made in cattle, and a few non-enumerated.

The probabilities are that you will receive a much better report from Dubois in 1872, according to the interest manifested by the Society, and farmers and mechanics generally.

It is impossible to give correct statistics of the wheat, corn, oats and other crops, as there was only one entry of yellow corn, and two entries of wheat. Considerable quantities of barley is raised every year. Also, of hogs and beef cattle. No market for butter; average price, 12½ cents per lb.

Poplar, oak and walnut lumber, the great staple of the county, also, hickory and some cherry.

JOHN GRAMELSPACHER,

Secretary.

## EDINBURG UNION.

The Edinburg Union Agricultural Society composed of the Counties of Johnson, Shelby, Bartholomew and Brown, held its Thirteenth Annual Fair at Edinburg, September 24th, 25th, 26th, 27th and 28th, and was a complete success in every respect.

## ENTRIES.

Live Stock.....	401
Agricultural.....	298
Mechanical.....	211
Miscellaneous.....	378
Total.....	<u>1,283</u>

## RECEIPTS.

Received for tickets.....	\$2,414 50
Received for entry fees.....	523 40
Received for stands, etc.....	910 15
Total.....	<u>\$3,848 05</u>

## EXPENDITURES.

For expenses of Fair.....	\$ 607 05
For cash premiums.....	2,014 50
Net profits.....	1,227 50
	<u>\$3,848 05</u>

There was a large amount of live stock on exhibition, and of excellent quality. The show in the Mechanical, Agricultural and Miscellaneous Departments was also very fine. The attendance was unusually large, especially on Thursday and Friday, and great interest was manifested by both exhibitors and spectators.

Of wheat, there was not quite the usual acreage sown last year. The average yield was about 15 bushels per acre. The favorite varieties in this section are Tennessee White and Smooth Red; had no fly or weevil this season. The

price has averaged about \$1.25 per bushel. The acreage this fall is about 15 per cent. above the average; about 5 pecks of seed per acre is used. The favorite varieties of corn are Armstrong and White Gregory; the average yield 50 bushels per acre; average price, 30 cents per bushel; cost of production, about \$5.00 per acre. There is not much attention paid to grass raising. Native blue grass is the favorite pasturage, and timothy is the favorite for hay.

Short-horn cattle are the favorites here for all purposes.

A cross of Poland and China are considered the best hogs.

There is not a very large amount of potatoes raised in this section, only enough for home consumption. The favorite varieties are Early Rose and Peach Blows.

We have no wet lands in this section of country; the soil is a sandy loam.

Timber, hard maple, walnut, hickory, beech, ash, oak, elm and poplar.

Our best crops are wheat and corn.

The Edinburg Union Agricultural Society is the only one within a radius of ten miles. The annual meeting is held the fourth Saturday in November each year, and the Fair is held the last week in September.

J. M. KELLY,  
Secretary.

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## FOUNTAIN, WARREN AND VERMILLION.

Our society is composed of parts of the counties of Fountain, Warren and Vermillion, Indiana, and was organized under the present management, in the year 1860; this being the Thirteenth Annual Fair, held at Covington, Indiana, September 24th to 27th, 1872.

Time for holding the election of officers: the first Saturday in February, of each year.

The fair was a success financially. The competition for

premiums in stock, was not as full and good as former fairs, but the other departments were very well filled, and as good as former years.

The number of entries were as follows: horses, jacks and mules, 62; cattle, 15; sheep, 17; hogs, 25; poultry, 5; all other entries, 407; making in all, 531.

Total receipts, gate money and show licenses, etc.	\$1,623 24
Premiums paid out.....	\$727 00
Expenses of fair and grounds.....	470 00
	<hr/> 1,197 05
Cash on hand.....	\$425 19

The crops in this part of the State are generally good—the wheat more than an average crop. Price of wheat about \$1.40 per bushel. Corn crop very good; new corn sells for 25 cents per bushel. Potatoes are plenty; average price 40 cents; peach blows most profitable.

Considerable improvement is being made in stock, and in the mode of farming in this part of the State.

ISAAC HAUPT,  
Secretary.

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### FRANKLIN COUNTY.

Very little reliable information concerning crops in this county can be given, as a majority of farmers make no note of kind or quantity of seed per acre nor time of sowing.

The kinds of wheat sown are mostly what is known as the red and swamp varieties. Some new varieties are on trial. The quantity sown per acre varies from one and a half to two bushels per acre. The grain generally remains in the field until it is threshed.

The average price is probably \$1.25 per bushel.

The yield of corn is estimated at 38 to 40 bushels per acre. The average price is about 44 cents per bushel.

Timothy is considered best for hay and, clover for pasturage. The quantity of seed sown per acre is about one-sixth of a bushel of timothy and one-eighth of a bushel of clover.

The average yield of timothy per acre is about one and one-fourth tons. The average price \$14 per ton.

There are no dairies in this county. The average price of butter is 25 cents per pound.

Of sheep, the Cotswold and Southdown are considered best, the latter being preferred for mutton. Sheep growing is considered very profitable.

The varieties of hogs known as McGhee and Chester Whites are the favorites. The prices per pound for fresh cut pork is  $4\frac{1}{2}$  cents and for cured meat  $12\frac{1}{2}$  cents.

The Early Rose and Goodrich potatoes are the choice for early planting; the Peachblow and a few other varieties variously named for late planting.

In fruits, apples, pears, peaches, and grapes were an abundant crop and of first rate quality; large crops of Damson and Damascus Grapes.

#### SOIL, TIMBER ETC.

The river bottoms are a rich sandy loam; and the second bottoms are gravelly and the hills mostly yellow clay covered with leaf mould. The uplands are mostly clay soil. The soil in the eastern portion of the county is very rich and a part of it swampy; this part is being drained by tiles.

Wheat, corn and barley are the crops grown for profit, oats being grown only for home feed.

The timber is principally walnut, ash, oak, poplar, sugar, and soft maple, beech, sycamore, black and sweet gum, sassafras and buckeye.

#### AGRICULTURAL SOCIETIES.

I know of none in active operation except the one of which this is a report: "The Joint Stock Agricultural Association of Franklin County."

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Total Receipts at Fair.....	\$1,502 00
Expended in Premiums.....	1,125 00
Other expenses.....	377 00
Total,.....	—————\$1,502 00

Entries in the stock department.....	347
“ “ other departments .....	573

The entries of stock have largely increased except cattle, which was poorly represented. The other departments increased somewhat except the unenumerated, which owing to the classification of articles in the regular lists, was decreased from over 400 to 125.

Our first day was sparsely attended owing to various causes, but the third and fourth days our Fair was largely attended.

#### HISTORY OF THE SOCIETY.

A few words as to the history of our Society may not be uninteresting to those who take an interest in societies. Our Society was formed twenty-one years ago as a county society. The first fair was held at Laurel, and was then removed to Brookville. The great difficulty of procuring a good fair ground has always retarded the growth of our Society. Some years ago we purchased a small fair ground of  $5\frac{1}{2}$  acres in Brookville, but as there was not room for the farmers to drive in with their teams our fairs were poorly attend. The necessity of procuring other grounds forced its self upon the members and the consequence was that our Society was changed into a joint stock society, and we procured grounds one-quarter of a mile west of town containing nearly 25 acres conveniently eligible, and have one of the finest half-mile time tracks in the State. Three large halls, commodious round house offices, one amphitheater. The grounds well fenced, with good stalls for the accommodation of those bringing stock to our fair, all this work was done in the short time of five weeks. I confidently

believe that when we have finished our improvements we will have one of the handsomest fair grounds in the State.

F. R. A. JETER,  
Secretary.

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## GREENE COUNTY.

The Alabama wheat is considered the best variety for the soil of this county. The quantity of seed sown per acre is generally one and one-fourth bushels when sown broadcast, and one bushel when drilled. The average yield is about 12 bushels per acre; the crop is harvested by machinery; the average price is \$1.25 per bushel. We are not troubled with either the Hessian fly or weevil.

The best variety of corn for us is the large yellow. The average yield per acre is 35 bushels and the average price, 30 cents.

Of oats we sow 2 bushels to the acre; average yield, 40 bushels; average price, 25 cents.

Timothy is the most valuable grass; the quantity of seed sown is 4 pounds to the acre; yield, 2 tons; average price, \$6.00.

The average yield of butter is about four pounds per week per cow; cost of making, 4 cents per pound; average price 15 cents.

The favorite breeds of cattle are Short-horn, Durham and Jersey, (milkers.) The former being preferred for both beef and milk. Cost of raising, until three years old, \$20; average price at that age, \$35; value in spring and fall, \$40.

Large sheep are preferred for both wool and mutton. The cost of growing wool, per pound, is estimated at 25 cents. The growing of coarse wool is considered very profitable.

The Berkshires and Big Bone China are esteemed the best breeds of hogs. The prevailing mode of curing pork is to put down in brine for three weeks and then smoke.

Average price for mess pork and bacon is \$6.00 per hundred pounds.

The Shaker Russéts are the best variety of potatoes with us. We plant in trenches and cover with straw. Average yield per acre, 200 bushels; average price, 35 cents per bushel.

Rawle's Janet and Winesap are considered the best keeping winter apples; the usual price in this market is from 50 to 60 cents per bushel.

The soil is generally a black, loamy clay, well adapted to wheat and oats.

The principal forest trees are hickory, ash and oak.

There is no reliable information concerning the statistics of crops.

Our Fair for 1872 was held September 24th to 28th; it was not so prosperous as last year, much sickness preventing many from attending.

The total receipts amounted to \$1,000. Our premiums were all paid in cash, and these together with the improvements made on the grounds absorbed the receipts.

The total number of entries this year were 400, and included some of the finest stock ever shown in the county.

The fast ring was especially attractive, several fine horses being entered for the pacing match in which first-class time was made. The day was pleasant, and about 2,000 people were present to witness the race, which was quite satisfactory to all.

J. W. MIDDLETON,  
Secretary.

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## HARRISON COUNTY.

The Thirteenth Annual Fair of our Society, was held September, 10th to 13th, inclusive, 1872.

Under the regulation of our Directors no charge was



made for entries at our last and preceding Fair, but in payment of premiums twenty per cent. was deducted, which, with our Society, succeeds well, and we think creates a greater interest than we would otherwise have.

The competition and show in stock, especially horses, exceeds greatly that of any previous Fair, there being in two instances twenty-six entries for a premium, with a competition for every premium. In cattle, sheep and hogs a fair show was had, surpassing previous Fairs of our Society. More interest seems to have been felt by the farmers generally than at any former time in our county.

The agricultural products of the county were fairly represented.

The show of fruit could not be excelled at any of our county fairs.

We append a statement of receipts and payments as shown by statement of our Treasurer.

Amount received of former Treasurer...	\$ 156 43
Cash from sale of grass crop.....	100 00
Cash of County Treasurer.....	35 00
Cash for pasturage.....	48 75
Cash from shows, etc., at Fair.....	202 75
Cash from sale of tickets.....	1,321 73
	—————\$1,954 73

PAYMENTS.

Expense of Fair and premiums.....	\$1,431 68
Taxes paid.....	41 16
Expenditures on grounds, etc.....	260 50
	—————\$1,733 34

Balance on hand October 16th, 1872..... \$221 39

The officers of our Society were elected in January, 1872.

Respectfully submitted,

SAMUEL J. WRIGHT,

Secretary.

## JEFFERSON COUNTY.

The Fair was held at North Madison, September 23, 24, 25, 26 and 27, and was highly creditable to all concerned.

The show and competition in the Stock Departments was much more extensive and spirited than that of any preceding year.

The show in the Agricultural, Mechanical and Ladies' Departments, was also, very good.

The weather was very fine and the attendance large. Exhibitors and visitors were all interested, and generally well satisfied.

Total number of entries, 779.

Amount of premiums awarded, \$2,100 00.

The receipts and expenditures are as follows:

## RECEIPTS.

From old fund.....	\$ 848 54
From entry fees.....	612 60
From sale of tickets.....	1,959 87
From rents and privileges on grounds...	300 00
From County Treasurer, show license...	50 00
	<hr/> \$3,771 01

## EXPENDITURES.

Paid for repairs and buildings.....	\$ 850 00
Paid for expense of Fair, printing, etc..	595 00
Paid for premiums .....	2,100 00
	<hr/> \$3,545 00

Which leaves a balance of..... \$226 01

This balance will be spent in further improvements upon the grounds, which, with the improvements already made will make them very comfortable and convenient.

The time of electing officers is the second Friday in December. The regular meetings of the Board are the

second Friday in March, June, September and December.  
Place of holding Fair, North Madison.

J. R. DICKEY,  
Secretary.

### JOHNSON COUNTY.

The Annual Fair, for 1872 was held on the grounds of the Society at Franklin, September 17th, 18th, 19th, 20th and 21st.

The total number of entries was 884.

Total receipts, from all sources.....	\$2,519 33
Expenditures.....	2,494 54

Which leaves a probable balance.....	\$24 79
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The competition and show in the several departments was extensive and highly creditable to the Society, especially in the stock department, in which there was a splendid display of thoroughbreds and a very large exhibition of cattle, sheep and hogs.

The soil and timber of the county are generally good and of the varieties common to the summit lands, between White and Blue rivers. Our system of farming is becoming more thorough every year, and with the spirit of improvement that is manifested by our farmers generally, good results to the agricultural interests of our country may be looked for.

D. H. MILLER,  
Secretary.

## LAKE COUNTY.

The Fourteenth Annual Fair of the Lake County Agricultural Society was held at the Fair ground in Crown Point, on the 11th, 12th and 13th days of September, 1872. The first and second days were showery, and the prospects for the exhibition not flattering; but on the third day we had sunshine and success, with a large attendance from both Porter and Lake counties. The privileges of the Fair were open to Porter county in common with Lake, and many entries were made by citizens of that county. It is thought by most of the members that the Fair was held too early in the season.

The show of horses, cattle, sheep and hogs, was excellent; that of fruit and vegetables, fair; and the "fine arts" in Floral Hall, mingled with the beauteous array of natural flowers, arrayed by Mrs. J. C. Sanerman and Mrs. L. G. Bedell, displayed great taste and skill.

As a Society, we are in a flourishing condition, but we need enlarged grounds and better buildings. An effort is being made to supply these wants by another year. We number now four hundred members, among them the best farmers of the county.

The following copy of the Treasurer's statement of September 17th, shows our financial condition:

Received of former Treasurer.....	\$233 18
Premiums paid since.....	10 00
	<hr/>
Balance.....	\$ 223 18
Received of County Treasurer (shows).....	32 50
Received at Fourteenth Annual Fair.....	856 82
	<hr/>
Total.....	\$1,112 50
Paid Premiums.....	\$452 50
Paid expenses of Fair.....	292 70
	<hr/>
	745 20
	<hr/>
Leaving a balance in the Treasury of.....	\$367 30

## STATISTICS OF LAKE COUNTY FOR 1872.

**WHEAT.**—The best varieties of wheat in use in this County are the "Egyptian" and the "Mediterranean;" usually sow  $1\frac{1}{2}$  bushels per acre; average yield, 15 bushels per acre; average price, \$1.25 per bushel.

**CORN.**—Favorite varieties, small and large "Bounty," "Britain" and various other kinds planted; average product, 55 to 60 bushels per acre; price, 34 cents, and cost of production 18 cents per bushel.

**OATS, RYE AND BARLEY.**—Used for seed per acre, 2 to  $2\frac{1}{2}$  bushels, oats; rye as wheat; barley, very little sown; average per acre of oats, 40 bushels; price oats, 30 cents; rye, 50 cents; barley, 45 cents.

**GRASS.**—Most valuable grasses, timothy and clover. Seed, timothy, 8 quarts per acre; hay, per acre,  $1\frac{1}{2}$  tons; price, \$10 per ton.

**DAIRY.**—Average produce of butter per cow, 100 pounds; price, 20 cents; cost of production, 15 to 18 cents; cost of production of cheese,  $9\frac{1}{2}$  cents per pound; price  $12\frac{1}{2}$  cents.

**NEAT CATTLE.**—Favorite kinds, Durham and natives; best for milk, natives and grades of Durham; best for beef, Durham; cost of raising 3 year olds, \$20 to \$25; worth at that age, \$30 to \$35; cows, last spring, worth \$25 to \$30; cows now worth \$20 to \$25.

**SHEEP AND WOOL.**—Large sheep are most profitable for mutton and fleece both coarse and fine wool sheep are raised, and in small flocks the business of sheep-growing has been profitable. Large growers have had failures from "scab" and "foot rot."

**Hogs.**—Hogs have been greatly improved in the last few years; best breeds, "Poland China," or "Magie," and Chester White; pork 5 cents per pound. Hogs are most frequently sold on foot; still, some small farmers prefer to kill and ship dressed during the winter.

**POTATOES.**—Most profitable varieties, Early Rose and Early York for early potatoes; Peerless and Peach Blow for late; plant here in hills, one way rows, 3 to 4 feet apart, and about  $1\frac{1}{2}$  to 2 feet the other way. Some drill and plow; cultivated with plow and hoe; manured with barn-yard manure; average yield, 175 to 200 bushels per acre. Colorado bug destroyed some vines. Potatoes are worth now 35 to 50 cents per bushel.

**FRUIT.**—The different varieties are apples, pears, grapes, cherries and all kinds of berries; apples are the principal crop of larger fruit; peaches are killed out by cold winters; apples are worth 50 cents per bushel, and cost of production and marketing, 20 cents per bushel.

**SOIL AND TIMBER.**—The prevailing soil is clay loam, best adapted to corn, oats and grass. Forest trees in groves, oak of various kinds, and hickory.

**WET LANDS, IMPROVEMENTS, ETC.**—Best methods of ditching used, open ditches. Horses, hogs and cattle have all been improved in the past two years. Farmers plow deeper and use better agricultural machinery.

**AGRICULTURAL SOCIETIES.**—There are several "Granges," I believe, of what is called the "Patrons of Husbandry," but do not know much about their meetings or workings.

JOB BARNARD,  
Secretary.

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## LAWRENCE COUNTY.

There are quite a number of varieties of wheat raised in this county, but the Red Chaff Mediterranean is perhaps the most popular of all, because the most certain. The Swamp wheat and Delaware wheat are being introduced and

promise well. The White wheats are grown to some extent, but for some reason are very uncertain in their yield. The quantity of seed sown per acre is usually about five pecks. The price this season in Bedford has been \$1.25 per bushel. The remedy for Hessian fly is to put the wheat in well, so as to get vigorous plants.

The favorite variety of corn is a large pure white Gourd Seed Yellow, and a nearly red variety known as the "Little Jim." Average product about 35 bushels per acre. Price 40 cents per bushel at the crib.

The quantity of oats seed used per acre, about 6 pecks. Average yield 30 bushels. Price, this season, 20 cents per bushel.

Blue Grass for pastures; Timothy, Red Top and Clover for hay. Price per ton for hay, \$15.00.

Short-horn Cattle are the favorite variety, being the best for beef and milk. The cost of raising a steer 3 years old is about \$25.00. Usual price at that age, about \$30.00. Good dairy cows are worth from \$40 to \$50.

Cotswolds, South Downs and Merino Sheep are the kinds raised in this county Cotswolds perhaps the most popular breed. Wool growing in this county is profitable.

Poland, China and Chester White Hogs are the most popular breeds. The price of stock hogs this fall, 4 cents gross.

Early Rose, Climax and Shaker Russet Potatoes are the varieties usually planted.

Fruit culture is not prosecuted in this county to any considerable extent, as a source of profit.

The soil is mountain limestone. The crops most profitable are the cereals and grasses.

JOHN W. NEWLAND,

Corresponding Secretary.

The last Fair (for 1872), was held on the grounds of the Society from August 27th to 31st inclusive. This Society is known as the "Lawrence County Agricultural Society."

I give herewith an abstract of number of entries and amount of premiums awarded at said last Fair, viz:

	No. Premiums.	Amount.
Horses, Class A .....	253	\$785 00
Jacks and Mules, Class B .....	20	38 00
Cattle, Class C .....	43	119 00
Hogs, Class D .....	13	41 00
Sheep, Class E .....	12	35 00
All other classes .....	216	178 00
Totals .....	557	\$1,186 00

Which is an excess in numbers of previous Fair of 87.

By our Treasurer's report it appears that the following is a statement of receipts and expenditures of said Fair, viz:

Gate receipts .....	\$901 80
Entry fees .....	330 50
Stalls .....	69 95
Floral Hall .....	27 90
Eating stands, etc. ....	149 50
Total receipts .....	\$1,479 65

#### EXPENDITURES.

Premiums .....	\$1,186 00
Printing, music and all other expenses..	325 65
Total expenditures .....	\$1,511 65

Deficiency, \$32 00 which will be promptly made up by our public spirited stockholders.

CHAS. T. WOOLFOLK,  
Late Secretary.

#### MADISON COUNTY.

Whatever doubts may have existed in the minds of the



originators of the Madison County Joint Stock Agricultural Society, as to its success, such doubts have been totally dispelled by the glorious record the Society has made for itself during the present year. The Fifth Annual Fair of the Society was held on its spacious and beautiful grounds near Anderson, on the 3d, 4th, 5th and 6th days of September. The number of entries in every department of the Fair were largely in excess of any preceding year, the number in the aggregate being over 750. The display of fine stock was the best ever witnessed at this point. Farmers from Henry, Delaware, Hancock and Madison counties vied with each other in the display of cattle, hogs and sheep. The Floral Hall was filled to overflowing with the handiwork of the ladies, and presented to the eye of the visitor a perfect panorama of beautiful and tasty articles. The class and variety of needlework was undoubtedly the finest display of that character ever made in Eastern Indiana. Such seemed to be the acknowledged opinion of visitors in attendance from other and adjoining counties. In every sense, the Fair for 1872 was the most successful one ever held in this county. As an evidence of the crowd in attendance, it may be stated that on Thursday of the fair week, 4,946 single tickets were sold, add to these the family tickets, stockholders' families and children under ten years, and the number in attendance must have been quite 8,000 persons. The members and officers of the Society feel greatly encouraged at the manner in which the citizens of our county have sustained them, and they look forward to the future, feeling that with proper and judicious management, we shall do still better. The Society is now the owner of fourteen acres of the ground inclosed, and hold a lease for the remaining six acres. The report of the Treasurer shows us to be wholly out of debt, with a surplus of almost \$1,200 in the treasury. This is accomplishing much, in view of the fact that new floral and mechanical halls have been built during the present year, costing about \$800. The Floral Hall is planned after the State Fair Hall, but of smaller dimensions and presents to the public

a very inviting appearance. These new halls, together with our large and commodious amphitheater and unsurpassed half-mile track, furnish attractions to our grounds that can be excelled by but few county societies. The farming community appears to have taken a greater interest in our success this year than ever before, and we were at great pains and expense to make it an exhibition worthy of their support and patronage. Our premium list, in all its departments, amounted to \$2,000, and in evidence of the interest taken, not to exceed \$50 of the premiums offered but were awarded to successful competitors. Another feature of the 1872 exhibition was the determined stand taken by our officers against the admission of improper characters and gamblers, whose occupation at such places has been to fleece the unwary and tempt the innocent and unsuspecting. This class of sharpers were inexorably refused admission, and we had the pleasure of conducting the fair in such a manner as gave entire satisfaction to every person in attendance. Our advice to sister societies would be to incorporate upon their minutes a similar rule to ours, viz: "No confidence men or sharpers allowed within the enclosure."

The report of the Treasurer shows as follows, viz:

Amount on hand November, 1871.....	\$1,238 00
Amount received since.....	3,526 00
Total receipts.....	—————\$4,764 00
Amount paid on premiums.....	\$2,000 00
Amount paid on buildings.....	1,000 00
Amount paid for labor etc.....	570 00
	————— 3,570 00
	—————
Balance on hand November, 1872.....	\$1,194 00

EDW. P. SCHLATER,  
Secretary.

MONTGOMERY COUNTY. ,

Our Fair was held on the 27th, 28th, 29th, 30th and 31st of August. Unfavorable weather visited us at the commencement ; the rain dampened the hopes not overbright at first. We had moved our time ahead to accommodate Russellville and Tippecanoe, which was more courtesy on our part than good management. It placed our Fair too early in the year to suit our people, and the result was disastrous to us, causing almost a failure.

The number of entries were as follows :

Live Stock Department.....	199
Agricultural.....	71
Mechanical.....	64
Miscellaneous.....	131
Juvenile.....	61
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Total.....	526

Our receipts were extremely light, not being sufficient to carry us near through. Everything seemed discouraging and seems so yet. We need more ground, and can get it if we make the proper effort. We ought to give more liberal premiums and hold out better inducements, and we can do it and pay them too if we will change our financial system and adopt some new features as found in similar organizations. The clouds are dark but there is light beyond. "Where there's a will there's a way," and we still hope for better days. *Old Montgomery can not afford to be behind.*

The following is a statement of our financial condition :

## LIABILITIES.

One note due S. Gilliland, and interest.....	\$ 444 00
One note due S. Gilliland, and interest.....	108 00
One note due J. Chadwick, and interest.....	55 00
Two orders due of last year (1871).....	18 00
	<hr/>
	\$625 00
Expenses of 1872, including printing bill, work-	
hands, improvements, etc.....	516 15
	<hr/>
	\$1,141 15

## AVAILABILITIES.

Received in 1872 from the sale of tickets,	
ground rent and all other sources....	\$937 00
Due Society from Montgomery county,	
from licenses for shows, etc., about...	104 15
Borrowed from S. Gilliland to balance	
deficit.....	100 00
	<hr/>
	\$1,141 15

Believing that a more gratifying report will yet be made  
from our county in the future, with much respect,

A. W. LEMON,

Secretary.

## MORGAN COUNTY.

The kinds of wheat sown in this county, are chiefly the White, Mediterranean and Blue Stem. The first named is more in demand, but does not yield so much per acre as the other two, averaging 20 bushels on bottom, and 12 to 15 bushels on upland.

The favorite varieties of corn are the large White and Yellow, which in good soil yields from 50 to 80 bushels per acre. This year the yield was much greater.

Black Norway and Poland oats are principally raised here. The former standing up better and seeming hardier. Both yield well.

Timothy and Red Clover are esteemed the most valuable grasses for hay, and Kentucky Blue Grass for pasture.

Short-horned Durham cattle are regarded the best stock for beef, and crossed with common stock, the best for milk. Good cows in spring are worth \$50; in the fall \$40.

The larger breeds of sheep, especially the Cotswolds, are considered the more profitable both for wool and mutton than small fine wooled sheep. For the past two years wool growing has been profitable here.

A good portion of the county is well suited to the growth of hogs. We have many of the best breeds, among which the Chester White, Poland, Berkshire and Essex have their admirers. Pork is one of the staples of our county.

Potatoes have done well the past season, save in a few localities where they were cut short by the ravages of the Colorado bug. Early Rose, Russet, Neshannock and Peach Blows are highly esteemed and yield largely.

The soil and climate of Morgan County are well adapted to the culture of fruit. Apples, peaches, pears and cherries are abundant, many kinds, of superior quality. Grapes were plentiful and excellent in quality the last season.

In the river and creek bottoms the soil is a sandy, vegetable loam, underlaid mostly with limestone gravel. Upland soil is good and productive; clay subsoil. Poplar, oak, ash, hickory, beech and sugar maple are the valuable kinds of forest trees. A good deal of wet land has been reclaimed by ditching and under-draining, and has become very productive.

Our Twenty-first Annual Fair was held at Martinsville, September 10th to 14th, and was well attended, and one of the most successful ever held in the county. The stock department, in horses, cattle, hogs and sheep, was exceed-

ingly well represented. Number of entries, live stock, 370; farm products and mechanical departments, 264; domestic and miscellaneous, 217; total, 851.

#### RECEIPTS.

From County Treasurer, show license and bank tax.....	\$240 00
From booths and confectioners at Fair.....	180 00
From entry fees.....	297 00
From gate fees.....	1,451 00
	<hr/>
	\$2,168 00

#### DISBURSEMENTS.

Paid on indebtedness .....	\$ 200 00
Cash premiums.....	1,193 00
Silverware.....	222 00
Additional premiums.....	29 00
Lumber, police and repairs .....	304 00
	<hr/>
	\$1,948 00
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Balance in Treasury .....	\$220 00

R. V. MARSHALL,  
Secretary.

#### NOBLE COUNTY.

This Society was organized in 1855. Annual Fairs have been regularly held since that date.

The agricultural year commences on the first Saturday of April, when the usual officers are elected, settlements made with Secretary and Treasurer, and the business of the Society in general transacted for the ensuing year.

The farmers of this county, as a general thing, may be

credited with a fair spirit of enterprise. Each year marks a degree in the improvement of the quality of soil, in the grade of stock, and in the principles of a more systematic husbandry in general. Our soil, as a whole, is not inferior to any in Northern Indiana. It comprises sandy upland, (heavy timber), and prairie, with some marsh or wet land, susceptible of drainage. The county is well timbered and watered. The Elkhart river runs diagonally through the county, furnishing good mechanical power at various points. Two lines of railroads cross the county, which, intersecting at right angles about ten miles north-east of the center, furnish abundant means of transportation. The points for trade are Kendallville and Ligonier, from the latter the monthly average of wheat shipped during 1872 being over three million (3,000,000) pounds.

The Fair of this year, (Seventeenth) was held during four days of the last week of September, the attendance was large, and the display of produce, stock and manufactures (domestic) fine.

The excess of receipts over expenditures for the year ending April 1873, will be nearly three hundred dollars.

The fair grounds comprise eighteen acres of prairie, one-half mile west of Ligonier; provided with the necessary halls, sheds, stalls, etc., and a good half-mile race course.

H. G. ZIMMERMAN,  
Secretary.

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## PARKE COUNTY.

Barbour, Red Chaff, White, Red, Mediteranean and English are the varieties of wheat most popular; the quantity of seed sown is  $1\frac{1}{2}$  bushels to the acre; the average yield is 20 bushels per acre. The crop is cut by machinery and threshed from the shock and stack. The prevailing

prices are \$1.10 to \$1.50 per bushel. There are no certain remedies for the Hessian fly or weevil.

The varieties of corn are mostly Yellow and White Dent, and yields 45 bushels per acre. The prices paid are 25 cents to 35 cents per bushel.

The yield of oats is 45 bushels per acre and are worth 20 cents per bushel. Rye and barley are not much cultivated.

Clover and timothy are grown for meadow and blue grass for pasture.

The average price paid for butter is 20 cents per pound. Cheese 12½ cents per pound.

Short-horns are the favorite kind of cattle; the best for milk are the Devon, Alderney and Scrub; the best for beef and milk are the Short-horns and their crosses. The usual price for Durhams, at 3 years old, is \$75, and for common stock \$50. The value of good dairy cows is \$50 to \$75.

The large breeds of sheep are the most profitable, but the middle-wool sheep mostly raised. Wool-growing is very profitable.

The best breed of hogs are the Big Bone China and the Berkshire. The price of pork, gross, is 3½ cents.

The most profitable varieties of potatoes are the Early Rose, Early June and Peach Blow. The average yield is 150 bushels per acre.

All the varieties of apples for this latitude are cultivated. The price for winter apples is 40 cents per bushel.

The soil of this county is generally a sandy loam with a clay sub-soil. It is adapted to corn, wheat, oats, rye, barley, buckwheat, and in fact nearly all the small grains. Sugar-tree, beech, poplar, oak and walnut are the prevailing kinds of timber and they grow luxuriantly.

I have no reliable information or statistics of the aggregate annual amount of any staple products sold or produced in the county.

Wet lands are reclaimed by underdraining. Considerable improvement has been made in farming within the last two or three years.



Two Fairs have been held this year, one in June and one in the last week of August. Our Fair ground is located at Bloomingdale, Parke county, contains about sixteen acres, and is well fitted up for the purpose.

JOHN PICKARD,  
Secretary.

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### PERRY COUNTY.

The following report of the Perry County Agricultural Society is cheerfully submitted, as it records a success so little expected, and in a region in which agricultural progress is so much needed. Our First Annual Fair was held on the 2d, 3d and 4th days of October. The success attending it was a surprise to its friends. It was undertaken under circumstances the most unfavorable, neglected by the greater portion of the county; it was fostered but by this immediate locality. No faith was placed in its successful result, it was contended that Perry County lacked the energy, and the ambition to a progressive movement; that our people were so imbued with the old routine of things of fifty years ago, that an onward move was almost an impossibility. Undaunted by the complaint of these timid "Rip Van Winkle's," the association bearded the lion in his den, and announced its First Annual Fair, come what would the Fair should take place, though we admitted to ourselves that the outlook bespoke failure.

It therefore, affords great pleasure to announce to the Board, the fact, that the Perry County Fair, was in every respect a perfect success, even financially; though the association expected the sacrifice of more than the means on hand.

Exhibitors and visitors were equally gratified, but from want of experience many defects were apparent in its man-

agement; this, however, was overlooked by all, with an assurance that they would be remedied in the future.

That the success of our first Fair has aroused a feeling in our people that the association shall be encouraged and supported is now evident, and I am convinced that at the Second Annual Fair in 1873, the whole county will assist in a still greater triumph.

It is the intention of the Association to issue stock this winter, and purchase grounds on which to establish a course for the exhibition of stock.

E. LONGUEMARE,  
Secretary.

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### PORTER COUNTY.

The Egyptian is considered the best variety of wheat for the soil and climate of this county. The quantity of seed sown per acre is generally  $1\frac{1}{4}$  bushels; average yield twenty-five bushels; average price \$1.25. We are not troubled with Hessian fly or weevil.

What is known as the Illinois common Yellow and the "Calico," or variegated corn is deemed best; the average yield is 65 bushels per acre; the cost of production \$5 per acre; average price 30 cents per bushel.

Rye and barley are not grown to any extent. Of oats we sow generally 2 to 3 bushels per acre; the average yield is about 45 bushels per acre, and the average price 35 cents per bushel.

Clover and timothy are the most valuable grasses; the quantity of clover seed sown is  $5\frac{2}{3}$  quarts, and of timothy 4 quarts per acre. The yield of timothy is from  $\frac{3}{4}$  to 1 ton per acre, and the average price \$11 per ton.

The Durhams are the favorite breed of cattle for milk and beef combined, but for milk alone, the Devons are preferred. The cost of raising until three years old is estimated at \$20, and the usual price at that age is about \$40.

Large sheep are considered best for both wool and mutton. Wool-growing is profitable in this county.

Chester Whites and Berkshires are esteemed the best breeds of hogs. The prices of pork and bacon average about 11 cents per pound.

Early Rose and Peach Blow are the preferred varieties of potatoes. They are planted in both hills and drills, dressed with manure and thoroughly tilled. The average yield per acre is about 85 bushels; cost of growing is about \$5 per acre and the market price during the season is about 37 cents per bushel.

All kinds of apples do well. For winter use the Belleflower, Vandevere, Michael Henry Pippin, Wine Sap and Seek-no-further, are the favorites. The market price ranges from 75 cents to \$1 per bushel.

The soil is generally a black loam with a clay sub-soil, and is well adapted to the growing of wheat, corn, oats and potatoes.

The prevailing timber is linden, walnut, maple, beech, hickory, oak, ash and pine.

The receipts of our late Fair were \$1,445.45, and the expenditures \$1,501.25.

REASON BELL, Jr.,  
Secretary.

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## POSEY COUNTY.

The Fourteenth Annual Fair was held at New Harmony, September 10th, 11th, 12th, and 13th, 1872.

The financial exhibit will show the pecuniary success. On the second and third days, we had about 7,000 persons on the grounds each day, a good turn out the first day and about 5,000 on the fourth day.

We tried a balloon ascension for the second day, under the auspices of a Nashville, Tenn., company, and then a

second ascension on the fourth day, both of which were *failures*. The parties did not inflate their balloon to its full capacity, and all they seemed to care for was the money offered by the Society. If we receive any propositions from them hereafter, we expect to give them a "wide berth."

For the first time in a number of years we had a *dusty fair*. We had six good wells on the ground, affording an abundance of water for every purpose excepting to keep the ground moist.

Our show of hogs was large and fine. In some departments of the horse ring the exhibition was equally good. The show of sheep and cattle was considerably under the average. Floral hall department was not up to last year, but was equal to the average of former exhibitions.

We erected this year a good eating house, in which the renters made preparations to feed 500 persons per day; a good and convenient judges' and reporters stand, and some good hog pens.

We now have twenty-four acres inclosed, seventy box horse stalls, thirty open horse stalls, thirty cattle stalls, twenty-eight hog pens and fourteen sheep pens.

Our county is purely an agricultural one; we have no manufacturing or mining interests. Tappahannock and Rock, or English wheat is considered the best; the usual quantity sown is about  $1\frac{1}{4}$  bushels per acre, and the average yield this year has been 25 bushels per acre. It is nearly all stacked before threshing. The prices this season have run from \$1 to \$1.50 per bushel.

We have not used any remedies for insects injurious to crops, except by sowing seed early or late as the prospect for next year's damage indicated.

The wheat this year is the *great* crop, financially, it will be worth twice as much as the corn, as it has ruled higher in proportion in the market than for a number of years.

Yellow and white corn is in great abundance, and will average about 60 bushels per acre; at present there is no prospective demand for it that will make the price a paying one.

We usually sow 2 bushels of oats per acre: price this year, 25 cents per bushel.

Rye is very little raised in the county, and in the small grain line, barley ranks next to wheat in the amount sown, and in returns per acre, it sometimes surpasses wheat.

Clover, red top and timothy are the most valuable grasses, the quantity raised being in the order named. Clover is used the hay, pasture, and considerable is cut for seed, and with for aid of good clover hullers, the trade promises to become somewhat extensive and profitable; last year the yield was from 1 to 3 bushels per acre of first quality clean seed, and sold readily at \$6 to \$6.50 per bushel.

In sowing clover we use about one-tenth to one-eighth of a bushel per acre, timothy about one-eighth to one-sixth and red top one bushel per acre.

Hay averages about two tons per acre; sells in the field at \$8 to \$10 per ton, in the barn or stack at \$12 to \$15 per ton.

There is not much attention paid to making butter and cheese; the latter is made in very small quantities. Butter ranges from 10 cents to 25 cents per pound.

There are some thoroughbred Short-horns and Alderneys in the county which, with the grades from them, are taking the lead; the former for beef and milk and the latter as milk producers.

South Downs are the prevailing breed of sheep, with an occasional Cotswold or Leicester; though the grades and common stock outnumber all the others combined.

Poland-China and Berkshires are the only breeds of hogs sought after for improving the stock. Some of the farmers are almost making a specialty of one or the other breed, and thereby introducing much better stock throughout the county. A great amount of pork is packed during the season, which is shipped to New Orleans or Cincinnati, as the market promises.

Potatoes are not made an exporting crop, and for one or two seasons have been imported in considerable quantities to supply the demand for consumption and seed. Early

Rose is taking the lead for early use, and Peach Blow and Pink-eye for late. At planting time early kinds sold at \$2 per bushel, while the late kinds sold at \$1, and during the summer and fall at 50 cents per bushel.

All kinds of fruit, and in all varieties, are raised for home or market purposes. Small fruits were fine and abundant during the season. Peaches were abundant though rather smaller than usual, owing to the drought. Apples were abundant in some orchards while others had few or none.

The soil of the county ranges from the fine, rich bottom land of the Ohio and Wabash through all the gradations to poor, stiff clay land of the hills. The prevailing character of the soil is rich, and taking our wheat and corn crops as an index of what can be raised, is quite productive.

Our county abounds in all kinds of good timber, and for a while we had a large trade in sawing and shipping walnut lumber, but nothing has been done in that line of business during the present year.

Every year additions are being made to the implements and machines for cultivating and harvesting crops. During the past season one firm sold ten threshing machines besides reapers and mowers. There is a header working in the western part of the county which does good work.

Our citizens are getting hold of a better class of stock, but there has not been any large importation, the purchases being confined to persons who invest according to their fancy in something to improve the stock of the neighborhood.

Our Agricultural Society is the only one in the county, and we have our election the first Saturday in December; so at present the officers are the same as reported last year.

This Society was organized and held its first Fair in 1859, and has held a Fair each year since, with success, paying all premiums, expenses and purchases. We have \$1,100 loaned out at 10 per cent., which we are saving to give toward building a branch railroad to our grounds, which are 16 miles from the railroad.

Our receipts this year from the Fair proper, are larger than last year, and our expenses are heavier.

Gate receipts.....	\$2,261 65
Rent of booths.....	300 00
Rent of ground.....	284 25
Percentage on entries.....	413 35
Rent of horse-stalls.....	103 00
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	\$3,362 25

L. PELHAM,  
Secretary.

## PULASKI COUNTY.

Our Annual Fair, which was held September 10th to 13th, 1872, was a success; the weather was very unfavorable the first two days. The entries of horses, cattle and hogs were 40 per cent. greater than last year; sheep, 20 per cent. less. A great improvement is noticeable in the quality of cattle, hogs and sheep. The number of farming implements entered was 100 per cent. greater than last year, in the other departments a slight increase.

Our receipts during the fair amounted to \$917.45.

Premiums awarded and incidental expenses, \$600.

During the year we added five (5) acres to our grounds, built a floral hall, a number of stalls and pens.

Total receipts from all sources.....	\$1,941 75
Total expenditures,.....	2,180 96

The Swamp, Treadwell and Mediterranean wheats are the favorites, though many varieties are cultivated. One and a quarter bushels per acre is generally used in sowing.

The crop was very good this year; average 18 bushels per acre; price \$1.20 to \$1.30 per bushel. No fly or weevil.

Of corn, our farmers generally raise a mixed variety; some few a large white, and some yellow. The cutworm and drouth injured many fields of this staple. The crop will average about 45 bushels per acre; price from 25 to 30 cents per bushel.

Oats, 2 to 2½ bushels per acre for seeding. Crop light; average, not to exceed 20 bushels per acre; selling from 18 to 25 cents per bushel.

Rye, one and a half bushels per acre for seeding. But little raised; average, 15 bushels per acre; price 55 to 60 cents per bushel.

Grass—timothy and some little clover; 1 peck of seed is used per acre. Crop light this season; average, about 1 ton per acre; price, \$10 per ton. Our farmers mostly depend on wild hay cut on our prairies and marshes.

Butter, average price, 15 cents per pound. Cheese, 15 cents per pound. There being no dairies here, can give no estimate of cost of production, or average yearly product per cow. The favorite cattle are Short Horn Durham, a few only in this part. Cattle generally native and crosses. Good cows are worth from \$40 to \$50.

Not much attention given to sheep, farmers generally having but few, though wool growing is considered profitable.

Poland China, Chester White, Magee and Berkshire, are the favorite hogs. Can not give best methods of curing pork, as every farmer has his own best way.

Of potatoes, the Early Rose and Peach Blow are considered the most profitable. They are generally planted in hills and cultivated the same as corn, but few pay any attention to manuring; the average will not exceed 60 bushels per acre the present year; price 35 to 40 cents per bushel.

The prairie can not be called a first class fruit country, apples do tolerably well; the present year they are very plenty, though but few good winter; present price, 25 cents per bushel.



The prevailing soil is black prairie mixed with considerable sand, well adapted to corn, wheat, potatoes and grass.

Our timber small and rather scarce, White and black oak the principal kind; some little Burr oak, hickory, walnut and ash.

The usual method of draining is by open ditches; some of our farmers have been using tile drains the present summer, at present can not say with what effect.

Each year a great number of improved agricultural implements are purchased by our farmers, many of whom show a desire to improve their crops by using choice seed and agricultural machinery, and their stock by the introduction of thorough bred animals.

CHAS. H. GARRIGUÈS,  
Secretary.

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## RANDOLPH COUNTY.

The best varieties of wheat sown in this county are the Red and the Terre Coupe or Egyptian. The amount sown per acre is  $1\frac{1}{4}$  to  $1\frac{1}{2}$  bushels; the average yield this year was about 8 bushels per acre, a considerable portion of which was damaged by standing in the field after it was cut, awaiting threshing machines. The crop is being sold at from \$1.10 to \$1.40 per bushel.

The large yellow and white corn are the leading varieties. The yellow is fed to stock, while the white is used both for bread and stock; the average yield is 40 to 45 bushels per acre; the price at present is 25 cents per bushel.

We have a fair crop of oats; from  $1\frac{1}{2}$  to 2 bushels was sown per acre; the yield was about the same as corn.

There was but little rye and barley cultivated.

The grasses are clover and timothy; one bushel of clover seed sows here from 5 to 8 acres; our best farmers incline to sow the larger amount per acre. Hay will average 1 to

2 tons per acre, the crop being very poor this year ; price \$10 per ton.

No attention is paid to the dairy business, but almost every farmer makes more or less butter. I have no means of ascertaining the average yearly product or the cost of manufacturing ; the average price of butter is 15 cents per pound. No cheese brought to market.

Proper attention has not been paid to raising cattle, and the premiums offered by this Society are almost invariably won by Wayne or Henry counties, which adjoin our county. There is no great number of fine sheep in our county. Coarse-wool sheep appear to be more profitable for the farmer to raise for both wool and mutton, and wool-growing is now looked upon with more favor than heretofore.

Hogs are the most profitable stock raised in our county, and many of our farmers have hogs, 10 to 12 months old, that will weigh 300 to 400 pounds. The best breeds are the Poland, Magee and Chester Whites.

But little attention is paid to root crops, such as potatoes, turnips, beets, etc.

Apples, pears, peaches, cherries, grapes, strawberries, raspberries, currants, and gooseberries are raised to some extent, all of which, except apples, are consumed at home. The best varieties of apples for summer use are the Early June ; for fall, Maidenblush, Rambo and Winesap ; for winter, Smith's Cider, Winesap, Belleflower, White Pippin, Never Fail and White Winter Pearmain.

The soil is diversified, ranging from a cold, heavy clay soil to the very best bottom land, and is well timbered with oak, poplar, walnut, hickory, beech and sugar maple, also well adapted to raising corn and wheat when properly cared for. There is little wet land in our county but what can be easily put under cultivation. Our low lands are being fast underdrained by a good quality of tile, manufactured in considerable quantities in our county.

Our farmers are awakening to the necessity for improved implements for planting, cultivating and harvesting their crops, also, in improving their stock ; and we hope soon to

be able to say that the farmers of Randolph county will carry off, not only the premiums offered by this Society on stock and farm products, but that they will exhibit their products in other counties, and successfully compete for prizes offered by sister Societies.

The Second Annual Fair of the Randolph County Agricultural, Horticultural and Mechanical Association was held on the Fair grounds, at Winchester, Indiana, September 24th to the 27th, 1872, inclusive.

The time of holding our Fair is fixed permanently to commence on the fourth Tuesday in September.

Our meetings are held quarterly on the first Saturday afternoons of January, April, June and October. Our officers are elected at the October meeting, to hold one year from the first of January following their election and for the ensuing year.

The weather for our Fair this season was all that could be desired, but owing to the intense political excitement, our entries and attendance fell short of that of 1871; nevertheless our receipts were more than sufficient to meet all expenses.

Our entries, compared with 1871, are as follows:

	1871.	1872.
Class A, various kinds of stock.....	266	209
Class B, farm and garden products.....	168	190
Class C, engines and machinery.....	184	136
Class D, culinary and miscellaneous.....	161	153
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	779	888

The receipts and expenditures are as follows:

RECEIPTS.

From rent of grounds and privileges.....	\$180 40
From rent of stalls.....	44 50
From tickets and percentage on trotting.....	1,203 45
From advertisements in Premium List.....	52 00
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	\$1,480 35

## EXPENDITURES.

Lumber, material, labor, police and Assistant Secretaries.....	\$ 246 59
Printing, including 100 diplomas.....	158 25
Ribbon, muslin, etc.....	13 60
Paid for board and medical attendance of a lady injured by a horse.....	12 00
Premiums paid in full on last day of Fair.....	951 00
Postage, express and stationery.....	8 60
On hand to apply on payment of grounds.....	90 31
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	\$1,480 35

There is, also, an Agricultural Association organized at Union City, in this county, composed of some two or three different counties. It is well managed and very successful.

Our society has bought twenty-two acres of beautiful land for a Fair ground, on which we have a good track, for testing speed, two-thirds of a mile in length. Our grounds are well fenced, but need other improvements in the way of buildings. We are still in debt to the amount of about \$1,000, but have the promise of sufficient stock to meet the indebtedness.

EDMUND ENGLE,  
Secretary.

## RUSH COUNTY.

In answer to the interrogations, we reply, that Swamp and Mediterranean are the most popular varieties of wheat, the former the most certain; average yield, 15 bushels per acre; one and one-quarter bushels sown to the acre; crops secured by being cut by horse power; mostly threshed by

steam power from the shock. No effort against fly or weevil as we are but little troubled with them.

Corn—Large Dent with many varieties of white and yellow are popular; prices have ranged about 40 cents per bushel during season; the average product of our county will be near 50 bushels per acre this season.

Oats—Crop fine. Of the Norway, one and one-quarter bushels are sown per acre, of other varieties about two bushels per acre; oats will average about 40 bushels per acre; price, 30 cents per bushel. Rye and barley little grown.

Grass—Timothy with a mixture of clover for meadow is preferred. Owing to the drouth our hay crop was light, not more than one ton per acre. Blue grass preferred for pasture.

No attention paid to dairying except for home use. In regard to neat cattle, the Durham is considered the favorite for beef, also for beef and milk combined, and yet a question if not best for milk alone. At 3 years old a steer with good keeping is worth \$65. Dairy cows worth from \$40 to \$50; cost of raising, can not report.

Sheep—A cross of Cotswold or Leicester with Spanish Merino most profitable for wool and mutton, this cross making medium wool; not as profitable at present prices as cattle or hogs.

Hogs—Berkshire considered best, all things considered.

Potatoes—Early Rose for early, Peachblow and Peerless for late; the other varieties claim equality with many.

Fruits—Belleflower and Jenning or Neverfail and Smith's Cider are the most perfect apples this year.

Soil mostly black loam, adapted to all the cereals and grasses.

Timber—Popular, walnut, oak, ash, sugar, beech, etc.

Tile draining is the manner of reclaiming wet lands. Drilling corn is much practiced with satisfaction, as well as planting the same with two-horse cultivators very satisfactory.

The Society owns nearly thirty acres of land in fee simple,

inclosed with fence and hedge, one mile east of Rushville, on the Junction Railroad, where its cars stop for the accommodation of passengers. The last purchase, of nearly eleven acres, cost the Society \$250 per acre cash, which addition was necessary to make the grounds complete, probably not surpassed in the State, if equaled. All necessary halls and offices are completed, the grounds beautified, and stalls, pens and buildings to meet every requirement, a half-mile track built and in fine order.

The Society is out of debt, with exception of the last payment on their last purchase of land, which will be due on the 1st day of September, 1873, to the amount of \$900. We have in the treasury, above all dues, about \$125.

The entries at our last Fair were as follows :

Live stock.....	348
Farm products.....	220
Ladies' department.....	209
Miscellaneous.....	140

The receipts were as follows :

Sale of tickets.....	\$2,409 50
From other sources.....	1,380 43
Total.....	\$3,789 93
Total expenses.....	3,530 30
Balance .....	\$259 63

The premiums yet unpaid will reduce the balance to nearly \$125.

The show of all kinds of stock was good, some of the best herds of cattle in the State being on exhibition. We had the best display of agricultural implements ever exhibited on our grounds.

Our Society consists of 300 stockholders, whose families, except males under 21 years of age, are admitted free to the

grounds. Our family badges were \$1.50; single ticket 25 cents; so that, when our gate receipts are observed, added to our stockholders' families, and complimentary visitors, shows a large attendance. We view our society in a prosperous condition, and are improving our grounds accordingly, in order to meet the wants of our next exhibition to come off September 9th, 10th, 11th and 12th, 1873.

L. LINK,  
Secretary.

### THORNTOWN UNION.

This Association was organized in the year 1870, on the joint stock plan, by prominent citizens of Boone, Clinton and Montgomery counties, who have worked with a will to give the Society a name and position in our State not excelled by any other. Our third annual exhibition was held September 23d to the 27th inclusive, and far exceeded our expectations in every department.

The number of entries in the several departments was as follows:

Live stock.....	793
Mechanical.....	151
Agricultural.....	200
Miscellaneous .....	664
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Total.....	1808

Exceeding either of our previous exhibitions some 200. To attempt to give a description of the several departments would occupy too much space in your State Board Reports; and I will only say that in the live stock rings we had some of the best herds of cattle from Illinois and our own State. The show of horses was not excelled at the State Fair. Hogs and sheep were on exhibition in abundance from every part

of the State. The Agricultural and Mechanical departments were well represented. The Floral Hall was well filled and admired by all.

#### RECEIPTS.

Received from all sources during the Fair..... \$4,632 85

#### EXPENDITURES.

Cash premiums paid.....	\$2,876 30	
Expenses of Fair.....	675 70	
		<u>3,552 00</u>

Profits of Third Annual Fair..... \$1,080 85

#### *Financial Condition of the Association.*

Total cost of improvements on ground.....	\$6,804 02
Total premiums paid.....	7,809 30
Total expense of Fairs.....	2,091 21
Total expense of salaries, etc.....	416 71
	<u>                    </u>
Total.....	\$17,121 24

#### RECEIPTS.

Capital stock.....	\$3,234 13	
Total receipts from Fairs.....	13,255 28	
		<u>16,489 41</u>
Total debt.....		\$631 83

The small debt will be paid, and a dividend made to stockholders with the profits of our Fair for 1873, which will be held the week preceding the State Fair.

J. CRAWFORD ROUS,  
Secretary.



## VIGO COUNTY.

It is generally conceded that Alabama wheat is the best variety in use in this county; the quantity of seed sown per acre is about one and one-quarter bushels, and the average yield per acre is about fifteen bushels. The crop is secured in various ways, but most generally reapers are used for that purpose. The prevailing prices during the season have ranged from \$1.15 and \$1.50 per bushel. There is no known remedy for Hessian flies and weevil so far as can be ascertained.

The favorite variety of corn is large white, the average product of which per acre has been about forty bushels this season. The cost of production has been about \$5 per acre, and the range in price from 25 cents to 30 cents per bushel.

OATS, RYE AND BARLEY.—The quantity of seed used per acre for these several crops is about two bushels, three-fourths of a bushel and one bushel, respectively, the average yield being about: oats 35 bushels, rye 15 bushels, and barley 30 bushels per acre. The prices paid during the season were, for oats, 25 cents per bushel, rye 75 cents per bushel, barley, no fixed price.

The grasses considered the most valuable are timothy and clover, which is sown at the rate of about one-fifth of a bushel to the acre; the average yield per acre is about one and one-fourth tons, and the prices paid during the season have ranged from \$12 to \$15 per ton.

The average yearly product of butter per cow is about two hundred pounds, the average price of which may be stated at twenty-five cents per pound. There is very little cheese made in this county, and none at all for the market, so it is impossible to give any estimate on that subject.

The favorite kind of neat cattle is Short-horns, but graded cattle are considered the best kind for milk, also for beef and milk. The cost of raising them until three years

old is about \$30 per head, at which time they are usually worth \$50 to \$60 per head. The value of good dairy cows in the spring and fall ranges from \$40 to \$50

Large sheep are more profitable, either for their mutton or for their fleece. The cost per pound growing is about fifteen cents, and the quality is fine; however, wool growing is not considered profitable.

The Poland China, and Berkshire hogs are considered the best breeds; the prices during the present season have been from \$4 to \$5 per 100 lbs. The modes of putting up pork and curing bacon and hams are so numerous that it is useless to give any.

The most profitable varieties of potatoes are red and white Peach Blow, and Early Rose; the common system of planting is in hills and ridges, and there are a few who plant them under straw, and find the yield much larger by so doing. The mode of tillage is by clean culture without the use of manure, the average yield per acre being 125 bushels. The cost per acre of production is about \$10, and the average price per bushel 50 cents.

The varieties of fruits under cultivation are so numerous that it is impossible to name them, but for any information which readers may desire, would refer them to the Horticultural Reports.

The prevailing character of the soil of the county is clay, with a stiff clay subsoil; about one-third of the county is prairie land, where the soil is sandy; the crops to which it is best adapted are wheat, corn and grass. The different kinds of forest trees are oak, poplar, walnut, sugar-tree and hickory.

We have no reliable information or statistics of the aggregate annual amount of any staple products sold or produced in this county, there being no means of obtaining such.

We know of no methods used in ditching or draining, and reclaiming wet lands, or any considerable improvement introduced during the past two or three years in the modes of farming, in the kind of crops, in agricultural implements or in stock.

The Vigo Agricultural Society has a membership of about eighty.

The receipts and expenditures of the Fair of 1872 are as follows :

Receipts from all sources.....	\$5,246 34
Expenditures, for all purposes.....	5,293 82

The Fair was held on the Society's grounds near Terre Haute, commencing on Tuesday, September 17th, and continuing during the remainder of the week. The number of entries in all departments was large, reaching in all about two thousand, being a slight increase in the number since last year.

The articles upon exhibition were all very fine ; much better than has been exhibited here at any previous fair ; the exhibition of stock was very fine, and in numbers greatly in excess of last year. The fair was a success in every respect, but owing to some valuable improvements which the Society made upon its grounds it was unable to pay its premiums in full ; for all its receipts it had to depend upon the amounts received at the gates, there being no entrance fee upon articles exhibited or vehicles coming upon the grounds. The Society is out of debt and has one of the finest grounds in the country, comprising eighty acres, a part of which is a beautiful grove. It has a splendid mile track adjoining the grounds which is always kept in good condition.

Besides this Society, there is a Horticultural Society in the county which is in a flourishing condition, also, the Honey Creek Agricultural Society which holds its Fairs annually ; then we have several lodges of patrons of husbandry, which consitute all the societies of this county.

WM. H. DUNCAN,  
Secretary.

## WABASH COUNTY.

The Wabash County Agricultural Society was organized in 1852, and this year has held its Twentieth Annual Fair.

The fair for the present year was held on the Society's grounds, in the city of Wabash, September 17th, 18th, 19th and 20th, and was a decided success financially, although the entries were not so numerous as last year, as will be seen by the following statement of entries:

	1872.	1871.
Live stock department,.....	296	452
Agricultural department,.....	148	204
Mechanical department,.....	101	94
Domestic department,.....	534	510
Miscellaneous department,.....	194	264
Total number of entries.....	1,273	1,524

Total amount of current revenue account is four thousand two hundred and eighty dollars and ninety-one cents, which, after paying premiums in full to the amount of eighteen hundred and seventy-six dollars and seventy-five cents, together with all the expenses of conducting the Fair and making improvements, and paying the officers in December, will leave a balance in the treasury of some seven hundred dollars. The Society already has a surplus fund at interest of six hundred and one dollars and fifty-four cents.

The general success of the Society is remarkably good, all the premiums and expenses being paid in cash.

The following statistics in regard to the agricultural products of our county may be of interest, viz:

The best varieties of wheat in use are considered to be the Gipsy and Mediterranean. Quantity of seed used per acre is one and one-half bushels. Average yield per acre, fifteen bushels. The crop is cut mostly with reapers and common grain cradles, and is threshed with a machine. The average price per bushel during the past year was one dollar and thirty cents.

The large yellow and white corn are the favorite varieties.

The average product per acre is about forty bushels. Cost of production, about twenty cents per bushel. Average price, thirty cents per bushel.

**OATS, RYE, AND BARLEY.**—The quantity of oats used for seed is about two bushels per acre; rye, three fourths of a bushel; barley, one and one-half bushels. Average yield per acre of oats, ten bushels; rye, twenty bushels; barley, forty bushels.

Price of oats, 25 cts.; rye, 50 cts.; barley, 60 cts. per bushel.

Timothy and clover are the most valuable grasses. The quantity of seed used per acre of each is about  $\frac{1}{8}$  of a bushel. The average yield per acre during the past year was one-half ton, and the average price \$18 per ton.

The average yearly product of butter per cow is 200 pounds; cost of making butter and cheese ten cents per pound each. Average price of butter during the past year has been 15 cents per pound; cheese 18 cents per pound.

Large sheep are considered more profitable, both for mutton and their fleeces. Average cost per pound of growing wool is 25 cents. Coarse wool is considered more profitable than fine wool. Wool growing is profitable.

The most profitable varieties of potatoes are the Peach-blow and Michigan Russet. The common method of planting is in hills, and are tilled by plowing and hoeing. Average yield per acre is 250 bushels. Cost of production, 15 cents, and market price, 40 cents per bushel.

The soil of the county is generally upland, although we have a large amount of bottom land, there being four rivers within the borders of our county, and is adapted to the usual crops of the State, such as corn, wheat, oats, buckwheat, vegetables and grasses of all kinds. Our forest trees are abundant, consisting of poplar, oak, walnut, ash, hickory, beech and maple.

The methods generally adopted to reclaim wet lands are by large open ditches, sometimes of considerable length, and tilled portions are drained by putting in tile. We have several tile manufactories in our county.

CLARK W. WEESNER, Secretary.

LIST OF AGRICULTURAL AND HORTICULTURAL SOCIETIES IN INDIANA—1872.

NAME OF SOCIETY.	PRESIDENT	SECRETARY.	POSTOFFICE ADDRESS OF SECRETARY.	
			Town.	County.
Indiana State Board of Agriculture.....	Hon. Jno. Sutherland.....	At-x. Heron.....	Indianapolis.....	Marion.
Indiana State Horticultural Society.....	Dr. A. Farnas.....	W. H. Ragan.....	Clayton.....	Hendricks.
DISTRICT SOCIETIES.				
Bridgerton Union Agricultural Society.....	J. N. Miller.....	D. Seybold.....	Bridgerton.....	Parke.
Cambridge City Agricultural Association.....	A. B. Claypool.....	Jno. I. Underwood.....	Cambridge City.....	Wayne.
Fountain, Warren and Vermillion.....	Elias Stuber.....	Isaac Haupt.....	Covington.....	Fountain.
Gosport Mineral and Mechanical Association.....	David Gray.....	T. C. Bailey.....	Gosport.....	Owen.
Grand Prairie Agricultural Society.....	Jas. Mathers.....	R. D. Odle.....	Pine Village.....	Warren.
Henry, Madison and Delaware.....	N. R. Elliott.....	J. V. Clymer.....	Middletown.....	Henry.
Indianapolis Agricult'l, Horticult'l and Mech'l Asso.....	Owen Tuller.....	Lewis Jordan.....	Indianapolis.....	Marion.
Northeastern Agricultural Association.....	O. S. Durham.....	R. W. McBride.....	Waterloo.....	DeKalb.
Russellville Union Agricultural Society.....	Jno. R. Cole.....	Daniel Evans.....	Russellville.....	Putnam.
Southeastern Indiana Agricultural Society.....	J. B. Garard.....	Jno. P. Steir.....	Aurora.....	Dearborn.
Switzerland and Ohio Agricultural Society.....	O. E. Conrad.....	H. B. Sparks.....	Rising Sun.....	Ohio.
Thornstown Union Agricultural Society.....	Samuel Gutsinger.....	J. O. Mow.....	Thornstown.....	Boone.
Union Agricultural Society .....	.....	J. I. Thompson .....	Edinburg .....	Johnson.

Union Agricultural Society.....	J. B. Edwards.....	Gordon Ballard.....	Knightstown.....	Henry.
Union Agricultural and Mechanical.....	.....	L. D. Lambert.....	Union City.....	Randolph.
Union District Fair Association.....	Thos. G. Inman .....	Jno. Quigley .....	Looscootes.....	Martin.
County Societies.				
Allen County Agricultural and Horticultural.....	E. P. Randall .....	W. B. Walter.....	Fort Wayne.....	Allen.
Bartholomew County Agricultural.....	Joel Davis.....	Jno. D. Lyle.....	Columbus .....	Bartholomew.
Clay County Agricultural.....	Jno. G. Acklemin .....	David Notter.....	Bowling Green.....	Clay.
Carroll County Agricultural.....	A. Vangundy.....	B. S. Higgenbotham.....	Delphi .....	Carroll.
Daviess County Agricultural, Mineral & Mech'l Society.....	Wm. Hyatt .....	J. M. Haynes.....	Washington.....	Daviess.
Dearborn County Agricultural Society.....	J. H. Guard.....	Ed. F. Sibley.....	Lawrenceburg .....	Dearborn.
Decatur County Agricultural Society.....	Thos. M. Hamilton.....	F. M. Weadon .....	Greensburg.....	Decatur.
Delaware County Agricultural Society.....	M. C. Smith.....	J. A. Wachtel .....	Muncie.....	Delaware.
Dubois County Agricultural Society.....	O. F. Hobbs.....	J. Gramelspacher .....	Jasper.....	Dubois.
Elkhart County Agricultural Society.....	O. W. Bivins .....	J. W. Irwin.....	Goshen.....	Elkhart.
Fayette County Agricultural Society.....	A. T. Beckett.....	J. Leach .....	Connersville.....	Fayette.
Franklin County Agricultural Society.....	J. S. Martin.....	F. B. A. Jeter.....	Brookville .....	Franklin.
Fulton County Agricultural Society.....	S. Davidson.....	C. Chamberlain.....	Rochester .....	Fulton.
Gibson County Agricultural Society.....	A. B. Wilkinson.....	W. L. Dorsey .....	Princeton.....	Gibson.
Grant County Agricultural Society.....	John Ratliff.....	D. P. Cubberly .....	Marion .....	Grant.
Greene County Agricultural Society.....	Thomas Mason.....	J. W. Middleton .....	Linton .....	Greene.
Hamilton County Agricultural Society.....	E. Reeves .....	L. O. Clifford.....	Cicero.....	Hamilton.
Hancock Agricultural Society .....	S. T. Dickerson.....	J. V. Hinchman.....	Greenfield.....	Hancock.

## LIST OF AGRICULTURAL AND HORTICULTURAL SOCIETIES—Continued.

NAME OF SOCIETY.	PRESIDENT.	SECRETARY.	POSTOFFICE ADDRESS OF SECRETARY.	
			Town.	County.
Harrison County Agricultural Society.....	S. B. Luckett .....	H. M. Applegate.....	Corydon .....	Harrison.
Hendricks County Agricultural Society.....	J. L. Faught.....	J. P. Dibble.....	Danville .....	Hendricks.
Henry County Agricultural Society.....	R. H. Cooper.....	R. M. Nixon.....	Newcastle.....	Henry.
Howard County Agricultural Society.....	W. Blanch.....	P. E. Hoss .....	Oakland.....	Howard.
Huntington County Agricultural Society.....	J. D. Jones.....	Robert Simonton.....	Huntington .....	Huntington.
Jackson County Agricultural Society.....	Elkanah Cobb.....	Jas. Blyth.....	Seymour .....	Jackson.
Jefferson County Agricultural Society .....	J. G. Wright.....	J. B. Dickey .....	Madison.....	Jefferson.
Jennings County Agricultural Society.....	Col. K. Brown .....	J. L. Rely .....	Vernon.....	Jennings.
Johnson County Agricultural Society .....	O. B. Tarlton.....	H. Miller .....	Franklin.....	Johnson.
Knox County Agricultural Society.....	J. D. Williams.....	E. B. Steen.....	Wheatland.....	Knox.
Kosciusko County Agricultural Society.....	D. Rippey.....	W. B. Frank.....	Warsaw .....	Kosciusko.
Lagrange County Agricultural Society.....	C. B. Holens .....	Thomas Vankirk.....	Lagrange .....	Lagrange.
Laporte County Agricultural Society.....	I. N. Whitehead .....	J. P. Early.....	Laporte.....	Laporte.
Lake County Agricultural Society .....	B. Woods.....	Job Barnard .....	Crown Point.....	Lake.
Lawrence County Agricultural Society.....	Jesse Mitchell.....	C. T. Woolfolk.....	Bedford .....	Lawrence.
Madison County Agricultural Society.....	Wm. Crim .....	A. B. Kline.....	Anderson.....	Madison.
Marion County Agricultural and Horticultural Society	Fielding Deeler.....	J. T. Francis.....	Indianapolis .....	Marion.



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Marshall County Agricultural Society .....	H. G. Thayer.....	D. McDonald.....	Plymouth.....	Marshall.
Martin County Agricultural Society .....	F. W. Noblett.....	W. Z. Smith.....	Halbert's Bluff.....	Martin.
Montgomery County Agricultural Society.....	Samuel Gilleland.....	A. W. Lemmon .....	Crawfordsville .....	Montgomery.
Morgan County Agricultural Society.....	S. Barnard.....	B. V. Marshall.....	Martinsville .....	Morgan.
Noble County Agricultural Society.....	D. S. Scott.....	H. G. Zimmerman.....	Ligonier .....	Noble.
Orange County Agricultural Society .....	J. M. Hobson .....	Joseph Cox.....	Paoli .....	Orange.
Parke County Agricultural Society .....	Thomas Nelson.....	John Pickard.....	Bloomingtondale .....	Parke.
Perry County Agricultural Society .....	James Hardin.....	E. Longuemare .....	Rome .....	Perry.
Posey County Agricultural Society .....	M. J. Carnahan .....	L. Pelham .....	New Harmony .....	Posey.
Pike County Agricultural Society .....	P. McNabb.....	J. D. Boon.....	Petersburg.....	Pike.
Putnam County Agricultural Society .....	D. C. Donnohue .....	W. J. Hazlett .....	Greencastle.....	Putnam.
Randolph County Agricultural Society .....	P. Hyatt .....	S. E. Engle.....	Winchester.....	Randolph.
Ripley County Agricultural Society.....	Jefferson Stevens.....	W. H. Glasgow .....	Osgood.....	Ripley.
Rush County Agricultural Society .....	O. O. Hackleman.....	L. Link.....	Rushville .....	Rush.
St. Joseph County Agricultural Society.....	Eli Wade.....	J. B. Birdsell.....	South Bend.....	St. Joseph.
Spencer County Agricultural Society .....	Oliver Falling.....	J. W. Knicheloe.....	Rockport.....	Spencer.
Sullivan County Agricultural Society.....	Ferd. Basler .....	Calvin Taylor.....	Sullivan.....	Sullivan.
Tippecanoe County Agricultural Society .....	H. T. Sample.....	P. D. Hammond.....	Lafayette .....	Tippecanoe.
Union County Agricultural Society.....	Eli Pigman.....	A. F. Davis.....	Liberty .....	Union.
Vermillion County Agricultural Society.....	J. L. Thomas.....	J. A. Bell .....	Newport .....	Vermillion.
Vigo County Agricultural Society.....	Robert Hunter.....	Wm. H. Duncan .....	Terre Haute.....	Vigo.
Wabash County Agricultural Society .....	H. Caldwell.....	O. W. Weesner .....	Wabash.....	Wabash.

## LIST OF AGRICULTURAL AND HORTICULTURAL SOCIETIES—Continued.

NAME OF SOCIETY.	PRESIDENT.	SECRETARY.	POSTOFFICE ADDRESS OF SECRETARY.	
			Town.	County.
Warrick County Agricultural Society .....	B. S. Fuller .....	S. B. Taylor.....	Booneville .....	Warrick.
Wayne County Agricultural Society.....	O. T. Jones.....	R. J. Strickland.....	Centerville.....	Wayne.
Wells County Agricultural Society.....	J. M. Hoover.....	S. M. Dalley .....	Bluffton.....	Wells.
White County Agricultural Society.....	Jacob Raub.....	G. S. Kendall .....	Monticello .....	White.
HORTICULTURAL.				
Floyd and Clark Counties Horticultural Association...	G. A. Bicknell.....	S. P. Wilcox .....	New Albany.....	Floyd.
Wayne County Horticultural Society.....	J. A. Mendenhall.....	J. C. Batelliff .....	Richmond.....	Wayne.
TOWNSHIP AGRICULTURAL SOCIETIES.				
Alpha Agricultural Society.....	O. T. Redman.....	Wm. J. Young.....	Alpha.....	Scott.
Blue Creek German Farmers' Association .....	F. Geis.....	F. C. Boh.....	Huth .....	Franklin.
Brewersville Farmers' Club.....	Francis Coryell.....	W. L. Richardson.....	Brewersville.....	Jennings.
Butler Switch Agricultural Club.....	Samuel M. Crist.....	Henry Carney.....	Vernon.....	Jennings.
Busseron Agricultural and Horticultural Club .....	T. D. Harper.....	J. M. Shepard.....	Oaktown.....	Knox.
Chester Farmers' Club.....	Zeno Tomlinson.....	L. T. Tomlinson.....	Westfield.....	Hamilton.
Clay Township Agricultural and Horticultural Club .....	N. Stanton.....	John Kendall .....	Amo .....	Hendricks.

Decatur Agricultural and Horticultural Society.....	Amos Mills, Jr.....	Both Mills. ....	Valley Mill .....	Marion.
Delaware Farmers' Club .....	J. A. Medart.....	W. M. Duley.....	Rel.....	Ripley.
Dupont Farmers' Agricultural Society.....	J. H. Cline.....	J. W. Carga.....	Dupont .....	Jefferson.
Eagle Spring Farmers' Club.....	B. F. Harvey.....	C. L. Thompson.....	Madison .....	Jefferson.
Hopewell Agricultural Society.....	W. H. Furgeson.....	Ben. F. Byfield.....	Commisskey.....	Jennings.
Honey Creek Agricultural Society.....	J. T. Crandell.....	T. C. Pugh .....	Terre Haute.....	Viigo.
Honey Creek Agricultural and Horticultural Society...	S. J. Schooley.....	J. Johnson.....	New London.....	Howard.
Marion Farmers' Club .....	Thomas Davis.....	W. R. Davis.....	Paris.....	Jennings.
Metamora Farmers' Club.....	J. P. Alley.....	W. M. Banes.....	Metamora.....	Franklin.
Olive Township Farmers' Club .....	G. H. Loring. ....	W. H. Deacon.....	New Carlisle.....	St. Joseph.
Paris Agricultural Society .....	Stephen Cave.....	M. M. Hess .....	Paris.....	Jennings.
Pioneers' Farmers' Club.....	H. Sparrow.....	Washington Iden.....	Etna Green.....	Kosciusko.
Poplar Ridge Farmers' Club.....	J. B. Collins .....	J. G. Small.....	Carmel.....	Hamilton.
Prairie Farmers' Agricultural Society.....	W. N. Jones.....	O. H. Garrigues.....	Francesville.....	Pulaski.
Richmond Industrial Association.....	J. M. Garr .....	Oran Perry .....	Richmond.....	Wayne.
St. Peter's Improvement Club. ....	John Wenz.....	Andrew Wissel.....	St. Peters.....	Franklin.
Saluda Farmers' Association.....	Wm. H. Wells.....	B. F. Scull .....	Saluda .....	Jefferson.
Slate Farmers' Club.....	Sidney Butler .....	L. W. Hudson.....	Slate .....	Jennings.
Spice Run Farmers' Club .....	Thomas Furguson.....	Z. T. Denslow.....	Lovett .....	Jennings.
Sunman Agricult'l, Hortic'l and Pomological Society...	A. K. Campbell .....	John Bennett.....	Sunman.....	Ripley.
Tell City Agricultural and Horticultural Society .....	Phillip Werner.....	C. Nebelmesser.....	Tell City.....	Perry.
Union Farmers' Club.....	Orin Peck.....	Dolph Hardesty.....	Crown Point.....	Lake.

## LIST OF AGRICULTURAL AND HORTICULTURAL SOCIETIES—Continued.

NAME OF SOCIETY.	PRESIDENT.	SECRETARY.	POSTOFFICE ADDRESS OF SECRETARY.	
			Town.	County.
HORTICULTURAL.				
Kokomo Horticultural Society.....	B. Vaida.....	L. J. Templin.....	Kokomo ....	Howard.
Plainfield Horticultural Society.....	Chas. Lowder.....	John Morgan.....	Plainfield .....	Hendricks.
Richmond Horticultural Society .....	J. A. Mendenhall.....	R. S. Mitchell.....	Richmond.....	Wayne.
Terre Haute Horticultural Society.....	H. D. Scott .....	J. A. Madesitt .....	Terre Haute.....	Vigo.
Warren Horticultural Society.....	J. H. Carpenter.....	J. B. Dodge.....	Warsaw.....	Wayne.

# PURDUE UNIVERSITY. •

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*To the General Assembly of the State of Indiana :*

The Indiana Agricultural College, now called Purdue University, realized, in currency, two hundred and twelve thousand two hundred and thirty-eight dollars and fifty cents (\$212,238.50) from the sales of the land-scrip donated by the United States. With this money, government bonds were purchased ; and a part of the interest accruing on said bonds has been invested in a similar manner. Hence at the present time Purdue University has two hundred and fifty thousand dollars (\$250,000) of bonds commonly called 5-20's, and twenty thousand dollars (\$20,000) of currency 6's ; all of which are registered. For these bonds there has been paid, in currency, two hundred and ninety-two thousand and one hundred and seventy-seven dollars and eighty-seven cents (\$292,177.87). There are also in the Treasury of the University, seven thousand one hundred and sixty-seven dollars and fifty-two cents (\$7,167.52) in currency—being a balance of the interest received.

The present currency value of this fund derived from the sale of land-scrip is three hundred and fourteen thousand sixty-seven dollars and fifty-two cents (\$314,067.52) ; and the annual interest thereon is fifteen thousand dollars (\$15,000) in gold, and twelve hundred dollars (\$1,200) in currency. In addition to this, it is confidently expected that

Congress, at the approaching session, will largely increase the former grant to the States and thus enable "Agricultural Colleges" to do the work they were intended to perform without any assistance from the States for *current expenses*. (A bill is now pending in the United States Senate which donates one million acres of the public lands to each Agricultural College.)

By act of Congress and in accordance with the legislation of the State of Indiana: "No portion of said fund" (heretofore received from the United States land grant) "nor any interest thereon shall be applied directly or indirectly, under any pretence whatever, to the purchase, erection, preservation or repair of any building or buildings."

Besides the funds above specified, Mr. John Purdue obligated himself to pay one hundred and fifty thousand dollars (\$150,000) for the benefit of the University, in yearly installments of fifteen thousand dollars (\$15,000); and Tippecanoe county agreed to donate fifty thousand dollars (\$50,000) in annual installments of ten thousand dollars (\$10,000). Also, certain citizens in the vicinity of Lafayette gave one hundred (100) acres of very eligible land on which to locate the University.

As a tract of one hundred acres was considered too small to meet the wants of an Agricultural College, eighty-four (84) acres of land lying in the best possible position to the land donated, were bought at a cost of twenty-four thousand dollars (\$24,000). The sum of thirty-two thousand dollars (\$32,000) has been appropriated and in part expended for the erection of a dormitory for students. And for laying the foundation for the main college building, and for a dwelling house and barn, an additional sum of about ten thousand dollars (\$10,000) has been expended.

Mr. Purdue has so far redeemed his pledge, that another installment will not be due from him until May, 1874.

To meet the pledge of Tippecanoe county, the Board of Commissioners issued orders on the County Treasurer as the installments became due, to-wit: for ten thousand dollars (\$10,000) May, 1870; for ten thousand dollars

(\$10,000) May, 1871 ; and for ten thousand dollars (\$10,000) May, 1872. The first of these orders was paid last summer ; the last two were presented for payment as soon as drawn, but not paid for want of funds. They, with accrued interest, will probably be paid early in the year 1873.

At their session in August, 1872, the Board of Trustees of Purdue University ordered the erection of a dormitory with thirty-two (32) suits of rooms—three rooms to a suit ; which was at once placed under contract, to be completed for thirty-two thousand dollars (\$32,000. This building is now up to the third story. The Trustees also ordered that arrangements be made to build, with as little delay as possible, a chemical laboratory after the plan of the new Laboratory of Brown University, at a probable cost of fifteen thousand dollars (\$15,000); and a boarding house, the plans of which were ordered, and are in process of completion, at an estimated cost of fifteen thousand dollars (\$15,000).

And it is designed to proceed in erecting the main College edifice, the basement of which has been built in part. This main building will require for its completion, about seventy-five thousand dollars (\$75,000). All these structures are imperatively necessary to the successful opening of the Institution for the reception of students ; and if the requisite means can be placed at the command of the Board of Trustees, these buildings can and will be completed by the autumn of 1873.

In addition to buildings, there will be needed for the purchase of Chemical, Philosophical and Mathematical Apparatus, ten thousand dollars (\$10,000); for a Museum, ten thousand dollars (\$10,000); for a Conservatory, five thousand dollars (\$5,000); for a Library, ten thousand dollars (\$10,000); for fencing and ornamenting grounds of University, five thousand dollars (\$5,000); for boring an Artesian Well, five thousand dollars (\$5,000); for purchase of Farm Implements and Machinery, five thousand dollars (\$5,000); for purchasing stock of Horses, Cattle, Sheep and Swine, five thousand dollars (\$5,000); and for erecting a

barn and shedding for stock, farm machinery and crops, ten thousand dollars (\$10,000).

Thus, in the opinion of the Trustees, it will require at least one hundred and sixty-seven thousand dollars (\$167,000) between this and midsummer of next year, to put the buildings and other appliances of Purdue University in condition to open for the reception and instruction of students, on a basis which will compare favorably with kindred institutions in other States. And at most, the Trustees can have within that time, from present resources, only the \$40,000 donated and falling due from Tippecanoe county.

Under these circumstances, no alternative is left but to apply to the Legislature of the State of Indiana for an appropriation, at their present session, of one hundred thousand dollars (\$100,000). And we, the Trustees of Purdue University, hereby pray that such appropriation be made.

This may seem a large sum to ask, but when all the circumstances are considered, that impression will probably be entirely removed. There are but three State Educational Institutions, and those who feel State pride, such as we believe animates your honorable body, and who reflect that those Institutions are thrown open to the sons and daughters of every citizen of Indiana; that even the courses of Law and Medicine, and preparation for teaching are completed without any charge for tuition; we can then see readily why the Legislature—emulating with commendable rivalry our sister States of the West—has already made liberal appropriations for building and conducting the State Normal School, and will probably feel justified in granting the further sums asked for that Institution. From the same stand point, we submit, it can well be seen why this General Assembly should also grant to the State University the sum needed to erect a suitable building to contain the cabinet recently purchased by the Trustees, and an annual sum sufficient to make the income adequate to the position and wants of that Institution.



If these liberal appropriations already made and those we hope soon will be made to the Normal School and to the State University are just, and such as a wise and generous policy dictates—which we fully conceive to be the case—then we ask that the same wise and generous legislation be extended to place Purdue University on a basis which would insure success and be but a just response to the liberality heretofore displayed by the General Government; and be an additional incentive to new donations from that source—while a vacillating or parsimonious policy would assuredly have the opposite effect.

Your memorialists further believe there is no method better than liberal appropriations for education, by which life and property could be made more secure in our State, immigration encouraged, virtue strengthened, heavy expenditures for punishment or restraint of crime avoided; nor any policy other than that of fostering education in all its departments, whereby so much prosperity could be realized; so much development of mines and manufactures be effected; so much increase in our agricultural products be secured without deterioration of our rich soil; in short, by which Indiana could be made so enlightened and so worthy of her citizens.

In conclusion, we respectfully beg leave to remind you that the especial object and purpose of the Purdue University is to foster and advance the Agricultural and Mechanical interests of the State.

JOHN R. COFFROTH,  
JOHN A. STEIN,  
M. L. PEIRCE,  
I. D. G. NELSON,  
JOHN SUTHERLAND,  
L. A. BURKE,

*Trustees.*



## NATIONAL SWINE-BREEDERS' CONVENTION.

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In accordance with arrangements made at a meeting of this Association, held at Cooper Union, in New York, May 14th, the adjourned meeting was held at Indianapolis, Ind., November 20th, in the rooms of the Indiana State Board of Agriculture.

The committee appointed at the May meeting to prepare work for the Convention and to name committees to prepare reports upon the history, characteristics and a scale of points for the respective breeds of swine, and upon the question of what constitutes thoroughbred swine, had named committees upon the following subjects and points:

1. What constitutes Thoroughbred Swine?
2. On Berkshires.
3. "Improved Cheshires or Jefferson Co."
4. Chester Whites.
5. Essex.
6. Neapolitan.
7. Magie or Poland-China.
8. New Jersey Reds.
9. Suffolks and Other Small White English Breeds.
10. Yorkshires and Other Large White English Breeds.
11. Victorias.

The Convention was called to order by Mr. Heron, Secretary of the Indiana State Board of Agriculture, when Dr.

A. C. Stevenson, of Indiana, was elected Chairman of the Convention, and George W. Rust, of the Live Stock Journal, of Chicago, Secretary. A call of delegates was made, showing a good representation of men interested in the various classes of swine. Those present from States not regularly represented by delegates were invited to join in the work of the Convention, the same as full delegates.

Reports from the various committees were called for, when most of them reported, either personally or by letter. These reports, with a large mass of documents and correspondence in the hands of the general business committee and Secretary, were referred to the appropriate committees (which had been filled up) for revision before final action should be taken by the Convention.

These reports elicited much discussion, which we have not room for in detail, and must content the reader with the results of the work done by the Convention, in giving the history, characteristics, etc., of the various breeds discussed; with the scale of points adopted for judging of swine; resolutions, etc.

#### POLAND-CHINA.

Two quite elaborate reports were made on this class of swine; the majority report by Mr. Shepherd, of Illinois, and Mr. Baldrige, of Indiana; and a minority report by John M. Milliken, of Ohio. These reports elicited a long, random discussion, which resulted in referring both reports back to the committee, who afterwards united on the minority report of Mr. Milliken, which is as follows; and which was adopted by the Convention, thus fixing the history and name of this breed, about which there has been so much controversy.

The history of the breed of swine known as the Poland-China is as follows:

In the early history of swine-breeding in the Miami Valley, in Ohio, it is clear, from the best written authorities available, and from oral testimony, that there were two breeds, which to a great extent had been profitably crossed

with the common bristled breed of the country. These were the Russia and Byfield breeds. The Bedford breed is also named in connection with the other two. To what extent it was used can not now be readily determined.

In 1816, we have positive proof from an unquestioned source, that the Shakers of Union Village, situated in Warren county, Ohio, and being four miles from Monroe, in Butler county, purchased at Philadelphia *one boar and three sows* of what was at the time believed to be pure China. They were represented to be either imported or the immediate descendants of imported stock. They were called "Big China Hogs." These animals were the first China hogs ever brought into southwestern Ohio. Subsequently other China hogs were introduced and extensively used.

The Shakers and other judicious breeders in Warren and Butler counties, continued to use the breeds at command, and produced by repeated crosses a hog of exceeding fine qualities, for that period, which was generally known as the "Warren County Hog." These hogs, continually increasing in good qualities, were bred in both counties, and the very best specimens were carefully and interchangeably used, so as to make the best crosses.

Such was the progress that had been made in forming the ground-work of a good specimen of a hog. This condition of the breed continued until about the year 1835 or 1836, when Mr. Munson or Beach, of Warren county, first introduced the Berkshire, which were obtained from C. N. Bement, of the State of New York; other lots of Berkshires continued to flow into the Miami Valley until about 1841.

The Berkshire blood was liberally infused into the stock existing in not only southwestern Ohio, but in Kentucky also. Crossing with the Berkshires was almost exclusively done until about 1838 or 1839, when Mr. William Neff, of Cincinnati, imported some choice specimens of the Irish Grazier. This breed soon grew into high favor, and as a consequence, was liberally used in making crosses with the best specimens of the crosses previously made. This intermingling of blood, this crossing of breeds, continued for some

time. In a few years, however, the use of the purer blooded Berkshire was entirely discontinued, and there were no further importations made of the Irish Grazier. The breeders of swine in the Miami Valley settled down to the conviction that the basis of a good breed of hogs had been established, and that in the future, judicious and discriminating breeders could use, and if necessary modify, the material furnished, so as to meet the highest demands of the public. For more than thirty years no new blood has been introduced into our breed, and no effort made to obtain a new supply of the blood of either breed previously used.

While this is true, our breeders have not been indifferent to the further improvement of this breed. Stimulated by their success, they have perseveringly aimed to improve what they have been so successful in forming. The best points or qualities have been preserved, and where practicable, have been made even more excellent. All defective points or undesirable qualities have been corrected or improved by the care, skill and judgment of our experienced breeders.

Thus, we have a breed thoroughly established, of fixed characteristics, of fine style and unquestioned good qualities, which can be relied upon for the production of a progeny of like qualities and character.

The following is presented as the characteristics of the foregoing breed:

“The best specimens have good length, short legs, broad straight backs, deep sides flanking well down on the leg, very broad full square hams and shoulders, drooping ears, short heads, wide between the eyes, of spotted or dark color; are hardy vigorous and prolific, and when fat are perfect models all over, pre-eminently combining the excellencies of both large and small breeds.”

J. M. MILLIKEN,

*Chairman of Committee.*

The committee to whom was recommitted the two reports recommended the adoption of the above report, and they

further recommend that, in view of the difficulties in making a change in the name of any breed, the said name of Poland-China be recognized as the accepted name of this breed.

R. BALDRIDGE.

J. M. MILLIKEN.

#### THE BERKSHIRE.

The following report made by the Chairman of the committee, Mr. A. B. Allen, of New York, embraces the history of this breed, to which is appended the report of the committee of the Convention to whom it was referred, giving their characteristics.

1. The committee appointed to report on the above, respectfully submit: That from the best information they have been able to attain on this important subject, they find that swine of various colors, forms and sizes, have existed in Berkshire, England, from time immemorial. That family, however, which was the foundation of the present improved breed, was of a sandy or buff color, about equally spotted with black; was of a large size, a slow feeder, and did not fully mature till two and half to three years old. But as such, it was ever highly esteemed for the greater proportion of lean to its fat in its meat, and for the superior weight of its hams and shoulders; thus rendering the whole carcass peculiarly well fitted for smoking, for which purpose it was said to excel all other English breeds.

A colored portrait of one of the above old breed of Berkshire swine may be found in Professor Lowe's folio work on British Domestic Animals. The writer of this saw specimens thus marked, on his first visit to Berkshire in the year 1841 and again in 1867, but in form and size like the improved breeds of the present day.

2. *How the Improvement in the breed of Berkshire Swine was made.*—Sometime during the past century the more enlightened and enterprising farmers of Berkshire became aware of the great advantage it would be to them to improve

their swine. In casting about for the best kind of males to cross upon their females for this purpose, tradition affirms that they fixed upon the Siamese boar, then recently imported into England.

3. *What is the Siamese breed of Swine.*—In color, we are informed that it varies in shade, from a clear jet black, to a dark slate, or deep rich plum. It is of medium size, quick to mature, very fine in all its points, with short small legs and head, thin jowls, a dished face, slender erect ears, broad deep compact body, well ribbed up, extra heavy hams and shoulders, a slender tail, thin skin, and firm elastic flesh.

From the year 1837 to 1842, the writer of this possessed swine in his piggery, answering to the above description, except they usually had from two to three white feet, but no other white on them.

4. *Establishing the Improved Breeds of Berkshire Swine.*—After using the Siamese boar in Berkshire to the old style of females as long as it was considered best, he was discarded, and the cross pigs then bred together; thus establishing one of the most valuable and perfect breeds of swine now known, which may emphatically be called the farmer's hog.

5. *Superiority of Berkshire Swine for Smoked Meat.*—In one respect they may be said to excel all other breeds with which the committee are acquainted, and that is, in the superior weight and quality of their hams and shoulders; these yielding a much greater proportion of tender, lean, juicy, well marbled meat, in comparison to the fat, than can be found elsewhere. The sides also partake of the same desirable qualities and are therefore of superior excellence for bacon. Considering these, it is to be hoped that the Americans, at least, will never attempt to alter the breed by crossing other swine upon it, for the only result will be a deterioration. The Berkshire can improve most other breeds, but no other breed that we know of can improve them; we would not even recommend a fresh cross of the pure Siamese.

6. *Supposed Stolen Cross of the Spotted Black and White Chinese.*—The writer of this has been asked how it



is that white spots are found in the improved Berkshire, if no other colors prevailed in the breeds used to form it, than black and buff, as described above. He can account for it in no other way than by supposing a stolen cross may also have been taken from that family of the Chinese, which is about equally spotted in colors of black and white. Such of these as the writer possessed in his piggery upwards of thirty years ago, were much like the Siamese, save that they were not so heavy in the hams and shoulders; were flatter in the sides, with more belly, fuller in the jowls, and had little lean meat in the carcass. We have occasionally seen pigs called the improved Berkshire, as fat jowled and as spotted as these Chinese, but the better breeders rejected them as more fitted for salt pork for barreling, and adhered to those with a greater proportion of the darker colors, finding them much superior for ham and bacon, and also for fresh pork.

7. *When the Improvement Commenced.*—In what year during the past century the Siamese cross on the old breed of Berkshire swine was first taken, the committee have been unable to learn, but when in England, in 1841, the earliest intelligence that the writer of this could obtain from the oldest breeders, on this interesting subject, was from Mr. John Westbrook, of Pinckney's Green, Byham, Berkshire, who informed him that his father possessed them as far back as the year 1780, in great perfection, and substantially like the best of those bred in the Shire at the time of his visit. Several other aged men informed him that the improved breed had existed in various districts there from their earliest recollection, but it took some time for them to pervade the country generally, the old unimproved maintaining their ground to a greater or less extent in all their size and coarseness down to the fore part of the present century.

8. *Color and Marking of Best Bred Berkshire Swine.*—The favorite color among the best breeders in 1841, was a deep, rich plum, with a slight flecking on the body of white or buff, or a mixture of the two; a small blaze in the face; two to four white feet, and more or less white hair in

the tail. The plum color was preferred to the black or slate, because it carried rather higher style and finer points with it, a superior quality of flesh, softer hair and thinner skin. In fact, to use a just and expressive phrase, the animals thus marked seemed higher bred.

9. *Size of the Berkshire in the year 1841.*—The live weight of good, full-grown, well-fatted animals, at that time, varied from about 400 to 600 pounds; in a few extreme instances, reaching to 700 or 800 pounds. The first two weights above, are about the average of the present day.

10. *Earliest Importation of Berkshire Swine into America.*—The first importation of which we can find any record was made in the year 1823 by Mr. Brentnall, an English farmer, who settled in English Neighborhood, New Jersey. The second was made in 1832, by M. Harves, another English farmer, who lived in Albany, New York; and others in the United States and Canada, too numerous to mention, soon followed with larger importations. All these Berkshires were substantially the same in size, quality, style and marking, as the best of the present day.

A. B. ALLEN.

The committee submit the following standard of characteristics and markings:

Color black, with white on feet, face, tip of tail, and an occasional splash of white on the arm, while a small spot of white on some other part of the body does not argue an impurity of blood, yet it is to be discouraged to the end that uniformity of color may be attained by breeders; white upon one ear, or a bronze or copper spot on some part of the body argues no impurity, but rather a reappearance of original colors. Markings of white other than those named above are suspicious, and a pig so marked should be rejected.

Face short, fine and well dished, broad between the eyes. Ears generally almost erect, but sometimes inclining forward with advancing age; small, thin, soft, and showing veins. Jowl full. Neck short and thick. Shoulder short

from neck to middling deep from back down. Back broad and straight, or a very little arched. Ribs—long ribs, well sprung, giving rotundity of body; short ribs of good length, giving breadth and levelness of loins. Hips, good length from point of hip to rump. Hams, thick round and deep, holding their thickness well back and down to the hocks. Tail, fine and small, set on high up. Legs, short and fine, but straight and very strong, with hoofs erect, legs set wide apart. Size medium. Length medium; extremes are to be avoided. Bone, fine and compact. Offal, very light. Hair fine and soft; no bristles. Skin pliable.

The Berkshires are hardy, prolific and excellent nurses; their meat is of a superior quality, with fat and lean well mixed.

Signed,

GEO. W. JONES,  
JACOB KENNEDY,  
I. N. BARKER.

#### CHESHIRE OR JEFFERSON COUNTY SWINE OF NEW YORK.

These hogs originated in Jefferson county, New York, and it is claimed by some of the breeders that they started from a pair of pigs bought of Mr. Woolford, of Albany, New York, which were called Cheshires. However that may be, there is no such distinct breed of hogs known as Cheshires in England, and there is no record of any hogs of this name having been imported into this country.

Yorkshires have been imported into Jefferson county from time to time, and the so-called Cheshires have been improved by crossing with the best hogs bought in Canada.

Mr. A. C. Clark, of Henderson, was for a number of years a prominent breeder of these pigs, and he informed us that whenever he found a pig better than those he owned, he purchased it and crossed it upon his own stock. In this way this family of hogs have been produced, and they are now known and bred in many portions of the United States. Their breeding in Jefferson county has diminished during the last two or three years.

“They are pure white with a very thin skin of pink color, with little hair; are not uniform in this respect, as pigs in the same litter differ widely in the amount of hair; the snout is often long, but very slender and fine; the jowls are plump and the ears erect, fine and thin; the shoulders are wide and the hams full; the flesh of these hogs is fine-grained, and they are commended on account of the extra amount of mess pork in proportion to the amount of offal; the tails of the pigs frequently drop off when young.

F. D. CURTIS,

*Chairman.”*

The report was accepted and adopted.

#### CHESTER WHITES.

The committee on this breed reported as follows:

*To the President and Members of the National Swine-Breeders' Convention :*

The undersigned delegates to this Convention submit a history and scale of points of the Chester White hogs as follows :

After a full investigation, and of personal knowledge on the subject, may say the Chester Whites as a breed originated in Chester county, Pennsylvania. The first impulse to the improvement of swine in this country was induced by the introduction of a pair of fine pigs, brought from Bedfordshire, in England, by Captain James Jeffries, and put upon his farm near the county seat of Chester county, in 1818. Some of the enterprising farmers of the neighborhood, seeing those fine pigs, were induced to commence an improvement of their swine by crossing these with their native white hog; their progeny with the best selection attainable in the county, and by careful and continued selection and judicious crossing for a number of years, have produced the present valuable well-formed, good-sized, easily-fattened and good bacon hog, called Chester White, and now a well established breed.

The following may be given as a scale of points:

“ Head short, broad between the eyes; ears thin, projecting forward and lap at the point; neck short and thick, jowl large, body lengthy and deep, broad on back; hams full and deep; legs short and well set under for bearing the weight; coating thinnish white, straight, and if a little wavy not objectionable; small tail, and no bristles.

THOS. WOOD,  
W. W. THRASHER,  
*Committee.”*

The above report, with sundry other papers relating to this breed, were re-referred to the same committee, and again reported and adopted without alteration.

#### JERSEY REDS.

The positive origin of this family of swine is unknown. They have been bred in portions of the State of New Jersey for upwards of fifty years, and with many farmers are considered to be a valuable variety. They are of large size and capable of making a heavy growth, five hundred and six hundred pounds weight being common. Mr. David Pettitt, of Salem county, New Jersey, has known of these hogs for thirty years, and Mr. D. M. Brown, of Windsor, for nearly fifty years. They are now extensively bred in the middle and southern portions of New Jersey. In some neighborhoods they are bred quite uniform, being of a dark red color, while in other sections they are more sandy and often patched with white, they are probably descendants from the old importations of Berkshires, as there is no record of the Tamworth, the red hogs of England, ever having been brought into this country; nor is this likely, as the Tamworth were not considered a valuable breed, and were confined to a limited breeding. The Reds resemble the old Berkshires in many respects, but are now much coarser than the improved swine of this breed.

## CHARACTERISTICS.

A good specimen of a Jersey Red should be red in color, with a snout of moderate length, large lop ears, small head in proportion to the size and length of the body; they should be long in the body, standing high and rangy on thin legs. Bone coarse, heavy tail and brush, hair coarse, including the bristles on the back. They are valuable on account of their size and strong constitution and capacity for growth. They are not subject to mange.

## DUROC.

There is another family of heavy hogs called Duroc, which are bred in Saratoga county, New York, which are finer in the bone and carcass than the Reds. They have been bred with their crosses in this region of country for about twenty years. They are very hardy, and grow to a large size.

Adopted.

F. D. CURTIS.

## NEAPOLITAN SWINE.

It seems strange that a breed of swine as noted as the Neapolitan is for possessing qualities of superior excellence, should have been so neglected by American breeders.

It is distinguished as the basis of improvement of several of the best breeds of English swine, and possesses that striking uniformity of characteristics among different individuals which marks a long established breed as well as good breeding.

“The Neapolitan breed is very thrifty, matures early and fattens quickly. Its meat is admitted to be more delicate than that of any other breed of swine, closely resembling that of a very fat young chicken. As others now think of importing more Neapolitan pigs, and as it may consequently, soon become an established breed with us, your committee recommend that the same range of premiums be awarded to them

hereafter as to the Essex, as they may be of great assistance in improving the breeds of swine through the country."

It is altogether probable that the reputation which the breed has for delicacy of constitution when young and in a cold climate, has deterred breeders from keeping these swine.

We can not however, learn that this reputation has a good foundation, for wherever bred, it has given high satisfaction. Still, breeders naturally have avoided having sows farrow in cold weather, (and what breeders do not?) and they have taken care that the young have not been exposed to cold storms, or too close confinement. In fact, the breed treated as any high bred race should be, has not proven delicate, but quite the contrary. The fact that the pigs are naked, almost perfectly hairless, has certainly more to do with the reputation for delicacy than anything else.

Like the thorough bred horse, the Neapolitan has a delicate look, a peculiar grace and stylishness, a look of intelligence, with a vivacity and sprightliness unusual in swine, and which in this breed do not seem to be incompatible with the surprising aptitude to lay on flesh, or to grow rapidly on a small amount of food.

The well known picture of Lord Western's Essex boar was produced by breeding together the pigs obtained by a direct cross of the Neapolitan boar upon the common Essex sow of thirty years ago. This picture, which almost every book on swine contains, gives a very correct idea of the general style of the Neapolitan hog. The head of the latter is not so dishing, and the body is deeper; the ears are not so erect and pricked up, but are carried nearly level and rather outward than forward. The bones are very fine and small, as shown in the head and feet. The writer has never seen so fine boned pigs, or any, which in low condition, were so firm fleshed and flat backed. As they gain age the proportionate length of the legs apparently increases, and in a sow heavy with young, they are nearly lost sight of, so to speak, and the teats drag upon the ground. With the writer, the young farrowed in summer have proved perfectly hardy, bearing confinement quite as well as young Berkshires, and

growing decidedly faster. There can be no doubt that the swine all over the Italian peninsula are more or less of the same general character, but less pure, or well bred, than those of the vicinity of Naples and Sorento. They are more or less banded and spotted with ashy white, and vary considerably in size and other points. In the vicinity of Naples, for hundreds of years, and possibly, as Martin supposes, from the time of the ancient Romans, this breed has had an existence. The color is described as slaty blue, inclining to coppery or plum color, which describes well the color of those in possession of the writer. Sidney describes it as "black or rather brown," but this is clearly a very loose statement. The description given by Sidney may well find a place here, as it is rare that writers upon the hog give one of the Neapolitan. He says:

"The Neapolitan pig is black or rather brown, with no bristles, and consequently delicate when first introduced into our Northern climate. The flesh is of fine grain and the fat is said to be free from the rankness of the coarser tribes."

Referring to the supposed descent of the breed from the wild boar of Europe, he adds:

"It is more probable that the Neapolitans are descendants of the dark Eastern swine imported by early Italian voyagers, and cultivated to perfection by the favorable climate and welcome food."

Neapolitan pigs have been for many years frequently taken to England. Martin credits the great improvement in English swine, which has taken place within thirty years, chiefly to the agency of the Neapolitan and Chinese breeds, either conjointly or to either alone. He names especially the Essex, Hampshire, Berkshire, Yorkshire, and to these Youatt adds the Wiltshire and enforces Martin's statements as to the Berkshire and Essex.

We can but regard this as one of the purest and most valuable breeds of swine in the world. It is of great antiquity and hence imparts its characteristics with great uniformity. It possesses the most delicate, tender and



delicious flesh of any well known breed, whatever may be true of the breeds of the distant East.

It is one of the easiest kept breeds known, being difficult to keep down in good breeding condition. It is one of the gentlest and easiest managed and least fastidious about food of any breed we have ever kept. The sows are good mothers, furnishing plenty of milk, and are reasonably prolific. The breed has, when killed, a minimum amount of offal and furnishes juicy hams and shoulders, well marbled and not coated with masses of thick fat, an abundance of leaf lard, and the most delicate side pork for salting for family use. In conclusion, we submit for the consideration a description and scale of points.

This description and scale has been made out without consultation with the balance of the committee and is submitted with diffidence. We feel, however, that it is very important that our breeders, and at least all judges at agricultural fairs, should have some guide sufficiently accurate, describing the various breeds, to enable them to determine, if unfamiliar with the best specimens of any breed, whether those presented are of the breed which they claim to be, and if they are fair specimens of the same.

M. C. WELD.

The member of the committee, reporting in addition to the description which follows, gives a scale of points in comparison with some other breeds, which we here omit, as the convention adopted a general scale of points.

#### CHARACTERISTICS.

Head small; front head bony and flat; face slightly dish-ing; snout rather long and very slender; ears small, thin, standing outward and forward nearly horizontally and quite lively; jowls very full but not large; neck short, broad and heavy above, with small dewlap; trunk long, cylindrical, well-ribbed back; back flat and ribs well arching even in very low flesh; belly horizontal on lower line; hind quarters higher than fore, but not very much so; legs very fine,

the bones and joints being smaller than those of any other breed ; hams and shoulders well developed and meaty ; tail fine curled, flat at extremity, with hairs on each side ; general color slaty or bluish plum color, that is, dark blue, with a cast of coppery red ; skin soft and fine, nearly free from hair, which when found upon the sides of the heads and behind the forelegs is black and soft and rather long ; flesh to the feel fine and elastic.

*Disqualification.*—1. Any color except uniform black, slate color, plum color or coppery slate, more or less dark. 2. A coat of coarse hair. 3. Any evidence of impurity of blood or a cross. 4. Any deformity or malformation.

The writer of the report also submitted a private letter from Dr. Phillips, of Memphis, another member of the committee, who corroborated many of the points in the report.

#### THE SUFFOLK.

The committee reported as follows :

Mr. Sidney says Yorkshire stands in the first rank as a pig breeding county, possessing the largest white breed in England as well as an excellent medium and small breed, all white, the last of which transplanted into the South, has figured and won prizes under the names of divers noblemen and gentlemen, and in more than one county. The Yorkshires are closely allied with the Cumberland breeds, and have been so much intermixed that, with the exception of the very largest breeds, it is difficult to tell where the Cumberland begins and where the Yorkshire ends. It will be enough to say, for the present, that the modern Manchester boar, the improved Suffolk, the improved Middlesex, the Cloeshill, and the Prince Albert or Windsor, were all founded on Yorkshire-Cumberland stock, and some of them are merely pure Yorkshires transplanted and re-christened.

Speaking of pigs kept in the dairy district of Cheshire, he says, "white pigs have not found favor with the dairy-men of Cheshire, and the white ones most used are Man-

chester boars, another name for the Yorkshire-Cumberland breed." He says in another place—and all the authors who have followed him, down to the latest published work on the subject, occupy space in describing various county pigs, which have long ceased to possess, if ever they possessed, any merit worthy of the attention of the breeder—"Thus the Norfolk, the Suffolk, the Bedford, and the Cheshire, have each separate notice, not one of which, except the Suffolk, is worthy of cultivation, and the Suffolk is only another name for a small Yorkshire pig."

#### CHARACTERISTICS.

Head small, very short; cheeks prominent and full; face dished; snout small and very short; jowl fine; ears short, small, thin, upright, soft and silky; neck very short and thick, the head appearing almost as if set on front of shoulders, no arching of crest; chest wide and deep—elbows standing out; brisket wide but not deep; shoulders thick, rather upright, rounding outwards from top to elbow; crops wide and full. Sides and flanks—long ribs, well arched out from back, good length between. Shoulders and hams—flank well filled out, and coming well down at ham; back broad, level and straight from crest to tail, no falling off or down at tail; hams wide and full all the way down; legs small and very short, standing wide apart, in sows just keeping belly from the ground; bone fine; feet small, hoofs rather spreading; tail small, long and tapering; skin thin, of a pinkish shade, free from color; hair fine and silky, not too thick; color of hair pale yellowish white, perfectly free from any spots or other color; size, small to medium.

#### THE ESSEX.

The Essex is a black hog originating in the south of England. They are of small to medium in size and are extensively used in England to cross on the large, coarse swine, to improve their fattening qualities.

The best specimens may be known as follows: Color, black; face, short and dishing; ears, small, soft, and stand erect while young, but coming down somewhat as they get age; carcass, long, broad, straight and deep; ham, heavy and well let down; bone, fine; carcass, when fat, composed mostly of lard; hair, ordinarily rather thin. The fattening qualities being very superior; as breeders they are very prolific, and are fair nurses.

L. T. CLARK,  
M. H. CRYER,  
C. F. FLETCHER.

*Committee.*

#### VICTORIA SWINE.

The Chairman of the Committee on the Victoria, Charles E. Leeland, of Albany, N. Y., reported, from which we condense the following points:

They were originated by F. D. Curtis, Charlton, Saratoga county, N. Y. They were produced by crossing the Byfield hog with the native in which there was a strain of the Irish Grazier. Subsequent crosses were made with the Yorkshire and Suffolk, the result being a purely white hog of medium size. The name has no significance, unless it is intended to compliment the Queen of England. These pigs, if pure, should all have a direct descent from a sow called "Queen Victoria," who may be said to be the mother of the family. Mr. Curtis has been breeding for a purpose, about twenty years. The report gives the following as the characteristics and standard of excellence of the Victorias:

The color is pure white, with a good coat of fine, soft hair; the head thin, fine and closely set over the shoulders; the face slightly dishing; the snout short; the ears erect, small and very light or thin; the shoulders bulging and deep; legs, short and fine; the back broad, straight and level, and the body long; the hams round and swelling, and high at the base of the tail, with plaits or folds between the thighs, the tail fine and free from wrinkles or rolls.

Feathers or rosettes on the back are common; the skin is thin, soft and elastic; the flesh fine-grained and firm, with small bone and thick side-pork. The pigs easily keep in condition and can be made ready for slaughter at any age.

#### YORKSHIRES.

Mr. O. P. Cobb, of the Committee on Yorkshires, made quite an elaborate report on this class of swine, principally descriptive, and portraying the good qualities and the influence it has had in forming many of the now popular breeds or families, claiming that, in point of size, shape, and quality of flesh, they were most desirable for the family or packers' use. They are hardy, prolific, quiet, feed well, and fatten quickly at any age. The characteristics and history of this old breed are so well known and found in nearly all the works on swine, that we omit the full report of the committee.

#### LANCASHIRE BREEDS.

M. H. Cryer, of Salem, Ohio, made a very elaborate report on this class of white swine, from which we condense the following descriptions, history of importations, etc.:

*"First, the Short-Faced Lancashire.*—This breed of swine may be known by the following characteristics: The shortness of face from the eyes to the end of the snout, prick ears, small bones, a good coat of white hair, cubic in form, with broad back and broad hams, well set down. The skin, as well as the hair, is white, although an occasional one may be found having a few dark blue spots in the skin, but never dark or black hairs. In September, 1870, M. H. Cryer & Co., made the first importation into this country, six in number. The second importation was made by C. W. Elliott, of Massachusetts, in the summer of 1871. The third one by Geo. W. Byers, of Sycamore, Ohio, in 1871. The fourth by M. H. Cryer & Co., in September, 1871.

*"Second, Large Lancashires.*—This variety of swine have

large bones, are of great height and length, and are the largest breed of swine known. The first importation was made by M. H. Cryer & Co., November, 1870. The second by O. P. Chaney, Circleville, Ohio. The third by George W. Byers.

*Third, Lancashire Middle Breed.*—This breed partakes of the qualities of the small breed and the size of the large breed, and are obtained by crossing large bred sows with small bred boars."

#### THE MOST PROFITABLE HOG FOR THE RAISER AND CONSUMER.

Your committee, to whom was referred a resolution as to what characteristics a hog should possess, to be the most profitable hog for the raiser and consumer, would respectfully submit the following:

He must have a small, short head, heavy jaw, and thick, short neck; ears small, thin and tolerably erect, not objectionable if it droops slightly forward; must be straight from the neck back to flank; must let well down to the knees in brisket; of good length from head to tail; broad on the back; ribbed rather barrel-shaped; must be slightly curved or arched in the back from shoulder to the setting on of tail; tail, small; long in the ham from hock to letting off the loins; shoulder, not too large to give symmetry to the animal; ham, broad and full; hair, smooth, and evenly set on; skin, soft and elastic to the touch; legs, short, small and well set under; broad between the legs; good depth between bottom and top of the hog; with pleasant, quiet disposition; should not weigh more than 300 to 400 pounds, gross, at twelve to eighteen months old, according to keep; color may be black or white or a mixture of the two. The above described hog will measure as many feet from the top of the head to setting on of tail as he does around the body, and will measure as many inches around the leg below the knee as he

does feet in length around the body ; depth of body will be four-fifths of his height.

W. W. THRASHER,  
O. P. COBB,  
RANKIN BALDRIDGE,  
*Committee.*

The motion for the committee, as well as the report of the same, brought out a long discussion, the movers arguing that the tendency was towards growing hogs too large for the greatest profit, and that the demand for all purposes of packing and ready consumption was for those of a medium weight ; testimony from packers was introduced favoring a medium sized hog. It was argued by others that there was a demand for some purposes of extra heavy hogs. The general feeling, however, was in favor of breeding a class of pigs that would mature early, and for weights at from 250 to 300 pounds, net. The report of the committee was adopted.

#### SCALE OF POINTS.

The committee reported the following scale of points aggregating 100 :

1. Back, 10 ; 2. Long ribs, 8 ; 3. Short ribs, 7 ; 4. Shoulders, 8 ; 5. Ham, 12 ; 6. Length of body, 6 ; 7. Flank, 6 ; 8. Twist, 6 ; 9. Snout, 4 ; 10. Jowl, 3 ; 11. Face, 3 ; 12. Ear, 2 ; 13. Neck, 4 ; 14. Belly, 4 ; 15. Skin, 5 ; 16. Hair, 3 ; 17. Bone, 3 ; 18. Legs, 3 ; 19. Feet, 2 ; 20. Tail, 1.

F. D. CURTIS,  
GEO. SPRAGUE,  
W. B. STONE,  
*Committee.*

Adopted by the Convention.

#### WHAT CONSTITUTES THOROUGHbred SWINE.

The committee report as follows :

In the absence of any system of records by which pedi-

grees of swine are kept, your committee can only give an expression, which, from the nature of the case, must be somewhat general.

Only such breeds should rank as thoroughbreds which are recognized in authentic history as of sufficiently remote origin, when bred in a direct line, to result in the establishment of a fixed type, capable of duplicating themselves with uniformity.

Your committee would recommend that the leading breeders of pure bred swine form breeder's clubs, for the purpose of establishing a herd registry, after the plan adopted by breeders of thoroughbred cattle, in order to secure greater uniformity, and to perfect, as soon as possible, the various breeds.

J. P. ROBERTS,  
G. SPRAGUE,  
F. D. CURTIS.

*Committee.*

Adopted unanimously.

#### CLASSIFICATION OF SWINE AT FAIRS.

A committee who were appointed to prepare a classification of swine, to be recommended for adoption by agricultural societies, reported as follows:

Class 1. Berkshires.

Class 2. Poland China.

Class 3. Large white breeds. To include Chester Whites, Large Yorkshires, Large Lancashires, Cheshires or Jefferson County, and other similiar swine.

Class 4. Small white breeds. To include Suffolks, Small Yorkshires, Small Lancashires, and other similiar swine.

Class 5. Small black breeds. Essex and Neapolitans.

Class 6. Cross breeds, and all not eligable in the other classes.

Adopted.

#### PERPETUATION OF THE ASSOCIATION.

The following committee was appointed with power to



call a future convention in five years or sooner, if in their judgment the interests of the swine breeders can be advanced by it:

F. D. Curtis, Charlton, N. Y.

A. C. Moore, Canton, Ill.

J. P. Roberts, Ames, Iowa.

J. M. Milliken, Hamilton, O.

Chas. Lowder, Plainfield, Ind.

Resolutions were passed, thanking the Indiana State Board of Agriculture for the use of their rooms in which to hold the convention; Mr. Heron, the Secretary of the Board; and the railroads for courtesies extended.

Adjourned.

#### NAMES OF DELEGATES ATTENDING.

The following are the names of the delegates who were in attendance:

S. D. Harris, Editor Rural New Yorker, Cleveland, O.

W. P. Sisson, Galesburg, Ill.

Rankin Baldrige, Hagerstown, Ind.

John Worrell, Jr., Clayton Ind.

A. C. Moon, Canton, Ill.

Job Rogers, Clayton, Ind.

George W. Jones, Prof. Iowa State Agricultural College, Ames, Iowa.

I. P. Roberts, Superintendant College Farm, State Agricultural College, Ames, Iowa.

E. Carson, Valley Mills, Ind.

J. J. Millhouse, Valley Mills, Ind.

R. P. Kimberlin, Tipton, Ind.

W. O. Reveal, Clermont, Ind.

R. L. Phillips, Franklin, Ind.

William P. Long, Clermont, Ind.

J. W. Armstrong, Indianapolis.

E. J. Armstrong, Indianapolis.

John M. Millikan, Hamilton, O.

W. B. Stone, Editor Western Planter, Kansas City, Mo.

- W. W. Thrasher, Groves Post Office, Rush county, Ind.  
Thos. Wood, Doe Run, Chester county, Penn.  
A. D. Hamrick, Hamrick Station, Putnam county, Ind.  
O. P. Cobb, Aurora, Ind.  
James Riley, Thorntown, Ind.  
Calvin Fletcher, Spencer, Ind.  
John W. Brand, Thorntown, Ind.  
M. H. Cryer, Salem, Ohio.  
L. T. Clark, Onarga, Ill.  
Jacob Kennedy, New Elizabeth, Ind.  
A. B. Claypool, Connersville, Ind.  
E. Mills, Noblesville, Ind.  
W. M. Moore, Covington, Ind.  
James Marshall, Middletown, Ohio.  
I. N. Parker, Thorntown, Ind.  
S. F. Pentecost, Zionsville, Ind.  
I. B. Gilbert, Lewisville, Ind.  
Seth W. Pearson, Lawrence, Kansas.  
Fielding Beeler, Indianapolis.  
H. Satterwhite, Martinsville, Ind.  
E. Hollingsworth, Farmer's Institute, Tippecanoe county,  
Ind.  
Dr. George Sprague, Des Moines, Iowa.  
George W. Rust, Publisher National Live Stock Journal,  
Chicago.  
J. J. W. Billingsley, Northwestern Farmer, Indianapolis.  
J. G. Kingsbury, Northwestern Farmer, Indianapolis.  
Thomas V. Mitchell, New Salem, Rush county, Ind.  
Col. F. D. Curtis, Charlton, N. Y.

**NATIONAL CONVENTION**

**OF**

**SHORT-HORN CATTLE BREEDERS.**

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The First National Convention of the Short-Horn Breeders of the United States and Canada assembled in the Y. M. C. A. Hall, in the City of Indianapolis, in response to a call issued by a committee appointed for that purpose by the Indiana Short-Horn Breeders' Convention which assembled in the Agricultural Rooms on the 21st of May, 1872. A large number of delegates were present representing eleven States and Canada. The presence of so large and intelligent a body of gentlemen from so many different States, indicates the great importance which this branch of agricultural industry is assuming in the country, and Indiana should feel complimented that the first Convention of the kind ever called in the country was held in her capital city.

The Convention was called to order at 10 o'clock by Claude Matthews, Chairman of the committee appointed by the Indiana Short-Horn Convention to call the convention.

Hon. A. C. Stevenson, of Greencastle, Indiana, was elected temporary Chairman, and George W. Rust, of the Chicago National Live Stock Journal, temporary Secretary.

The following resolution was offered by Mr. Claude Matthews and adopted by the Convention :

*Resolved*, That a committee of one be appointed from each State and Territory on permanent organization and the arrangement of business for the action of this Convention.

The following are the committee appointed :

J. Fogg, Massachusetts; Charles F. Wadsworth, New York; Charles E. Coffin, Maryland; Walter Handy, Kentucky; Thomas E. Talbot, Missouri; Alex. Waddel, Ohio; Claude Matthews, Indiana; John H. Bacon, Iowa; George Murray, Wisconsin; M. Miles, Michigan; David Chester, Canada; J. H. Pickerill, Illinois.

On motion of W. W. Thrasher the following resolution was adopted :

*Resolved*, That all gentlemen present, or that may hereafter be present, who are breeders of short-horn cattle, be regarded as delegates to this Convention, and that all delegates be requested to write their names and postoffice address on a slip of paper and hand it to the Secretary of this Convention, that they may be registered, and that every delegate in addressing the Chair shall announce his own name and postoffice address.

During the absence of the committee, remarks were made by several delegates, upon the importance of the Convention, and the business to be brought before the body.

The Committee on Permanent Organization made the following report, which was adopted :

#### PERMANENT OFFICERS.

President—Dr. A. C. Stevenson.

Secretary—B. H. Campbell, Batavia, Illinois.

Assistant Secretary—Professor G. W. Jones, Ames, Iowa.

Vice Presidents—J. P. Fisher, Danville, Kentucky; A. F. Wood, Mason, Michigan; J. G. Dunn, London, Mason county, Ohio; W. W. Thrasher, Groves, Indiana; Samuel Campbell, New York Mills, New York; Charles E. Coffin, Muirkirk, Maryland; Clinton Babbett, Beloit, Wisconsin;

J. G. Cowan, Oregon, Missouri ; M. H. Cochrane, Montreal, Canada ; Hon. D. Christie, Paris, Canada ; Wm. Brown, Berlin, Illinois ; J. H. Bacon, Washington, Iowa ; Wm. S. King, Minneapolis, Minnesota ; J. M. Wood, Factoryville, Nebraska ; A. Wilson, Silver Lake, Kansas ; M. W. Terrell, Middlefield, Connecticut ; Josiah Fogg, Deerfield, Massachusetts ; A. W. Griswold, Malvern Farms, Vermont ; J. G. Reed, Portland, Oregon ; W. Page, San Francisco, California ; James M. Byers, Glade Spring Depot, Virginia ; Mark R. Cockrell, Nashville, Tennessee ; David E. Davis, Salem, New Jersey ; C. Perceval, Vasselbro, Maine ; T. S. Cooper, Cooperstown, Pennsylvania.

Dr. Stevenson, on accepting the office, remarked that he esteemed the honor bestowed upon him one of the most distinguished of his life, and spoke of the great importance of the Short-Horn interest to the country.

He gave a brief statement of his experience in the business, and stated that he had found that the profits of breeding this kind of stock were fifty per cent. greater in weight than common cattle, and that fifty per cent more was received in price on an average.

A few days ago he had sold a few young, Short-Horn steers that brought him an average of \$135 per head, while common stock a year older sold for about \$75 only.

He hoped harmony and good feeling would prevail during the deliberations of the Convention.

#### NAMES OF DELEGATES IN ATTENDANCE.

Wisconsin—George Murray, Racine ; H. G. Sherman, Burnett ; C. Babbitt, Beloit.

Missouri—Wm. B. Collier, Bridgeton ; C. S. Quisenberry, Mexico ; Thomas E. Talbot, St. Charles ; J. G. Cowan, Oregon.

Michigan—M. Miles, Lansing ; A. F. Wood, Mason ; D. A. Curtis, Addison.

Massachusetts—Josiah Fogg, Deerfield.

Maryland—Charles E. Coffin, Muirkirk.

New York—J. R. Page, Lennet ; Charles F. Wadsworth, Genessee ; Lewis T. Allen, Buffalo.

Ohio—A. Waddell, J. G. Dunn, L. B. Sprague, James Fullington, Charles Lincoln, John Montgomery, Jesse Hagger, D. S. King, Thomas C. Jones, John G. Dunn, R. R. Seymour, John H. Bacon, Professor George W. Jones, N. W. Jones, Dr. George Sprague.

Kentucky—Major H. Owens, W. H. Richardson, J. M. Berry, Walter Hardy, J. P. Fisher, J. J. Gomme, J. G. Kinnard, E. L. Dnasire, E. G. Bedford, J. C. Jenkins, S. L. Patterson, M. Polk, George M. Bedford, Lucius Desha, Abram Van Meter, N. S. Patterson, M. Polk, Thomas Corrie, J. E. Suddeth, T. J. Megibben, J. E. Duncan.

Indiana—D. Chapman, Attica ; W. W. Thrasher, Groves ; J. T. Williamson, Thorntown ; Matthew Lowder, Plainfield ; S. L. Shields, Seymour ; A. B. Thrasher Groves ; Abram Williamson, Amo ; S. F. Pentecost, Zionsville ; R. G. Haworth, Liberty ; Penley Mitchell, Bloomingdale ; Claude Matthews, Clinton Alfred, New Maysville ; Milton Tomlinson, Westfield ; Daniel Comstock, Liberty Mills ; Thomas Willhoit, Mechanicsburg ; Henry Craven, Pendleton ; Dr. A. C. Stevenson, Greencastle ; J. W. Robes, S. F. Lockridge, A. M. Lockridge, A. J. Bryan, James Stevenson, Charles Lowder, Plainfield ; M. Thornberry, Dublin ; M. H. Waterman, Eugene ; W. H. Barnes, Metamora ; Robert Mitchell, Princeton ; David Johnson, Princeton ; Dr. J. Forsyth, John McCaslin, Isaiah Hornaday, Franklin ; L. B. Tomlinson, Worthfield ; J. M. Woodruff, Ninevah ; H. Troutman, Columbus ; L. M. David, Rushville ; W. C. Bice, Bluff Creek ; Isaiah Donahue, Cookerly ; G. W. Thomas, Homer ; M. G. Parker, Amo ; R. M. Hazlett, J. J. W. Billingsley, Indianapolis ; P. J. Browder, Greencastle.

Illinois—B. W. Brown, William Brown, C. C. Parks, J. G. Taylor, Harvey Sowdoski, William Noel, B. F. Dye, T. H. Crowder, W. H. Russell, D. Lewman, B. H. Campbell, A. B. Hazlett, J. D. Porter, W. R. Duncan, J. H. Pickerill, E. Doty, W. G. Culbertson.

## AFTERNOON SESSION.

The Convention was called to order by the President at 2 o'clock p. m., and proceeded at once to business.

The Committee on Business reported, suggesting,

First. That the Convention appoint a committee to report a permanent organization, constitution, by-laws, membership fees, etc.

Second. Exhibition of cattle at fairs—embracing appointment of judges and their duties, together with the condition of the cattle.

Third. Record of pedigrees.

The report was accepted.

On motion of Mr. Waddell, of Ohio, a committee of one from each State represented, was chosen to report a permanent organization.

The committee chosen were as follows :

H. B. Sherman, Wisconsin ; W. B. Collyer, Missouri ; D. A. Curtis, Michigan ; J. Foss, Massachusetts ; Charles E. Coffin, Indiana ; Charles F. Wadsworth, New York ; D. J. Jones, Ohio ; Dr. George Sprague, Iowa ; J. G. Kinnaird, Kentucky ; W. W. Thrasher, Indiana ; David Christie, Ontario ; W. R. Duncan, Illinois.

On motion the question was divided, and the discussion was commenced on the appointment of judges and their duty at fairs.

Mr. J. H. Pickerill, of Illinois, said that committees on cattle have frequently asked to be instructed upon this subject. He said that the way decisions were made at fairs was often unjust and absurd. He called upon the older members present to give their views.

Prof. Miles, of Michigan, favors judging by points. Committees dislike the trouble of taking the points, but he thought it the right way. He related his experience in teaching a class of young men on this subject. He thought the matter should be studied carefully. He favored one thousand as the aggregate of points, instead of one hundred.

He found it not so laborious to make awards on a scale of points as many supposed, and explained his method.

Mr. Waddell, of Ohio, stated that at the Ohio State Fair it was the custom to send to the leading farmers and breeders of the different counties and obtain the names of competent judges to serve on committees. As to the rule of points he thought, if it was adopted, such judges were unnecessary, and a tailor with his tape, would be all that would be required.

Mr. Baker, of Iowa, said that in his State, at the winter meetings, the members name the persons proper for judges. General satisfaction has been given by their judges.

Mr. Christie, of Ontario, thought that the Directors of a State Fair were responsible for a proper selection of their judges. It was their duty to make the appointment of judges as much as to transact any other business in connection with the management of exhibitions.

There is nothing in this matter of fairs of greater importance than a proper appointment of competent judges.

On motion of Mr. Page of New York, it was recommended to all Agricultural Societies to employ only experts to act as judges at fairs, and pay their expenses to and from fairs and while in attendance thereon.

Mr. Duncan, of Illinois, said that the difficulty in the decisions at Agricultural Fairs, was that the members of Boards of Agriculture were actuated more by other motives than those pertaining to agricultural interest. He would select only practical working men. He insisted that Boards of Directors should not shrink the responsibility of the decisions of their judges. Boards of Directors should superintend their own business and not leave it to superintendents.

The following was offered by Mr. Page, of Ohio:

*Resolved*, That the practice of many Societies of prohibiting consultation among judges is unfavorable to the making of correct awards, but we think that the most satisfactory results may be attained by balloting first and consulting afterwards.

Which was adopted.



Clinton Babbit, of Wisconsin, offered the following:

*Resolved*, That the president and directors of each agricultural fair are, in the opinion of this Convention, the proper officers to appoint judges, and should be held responsible for their fitness.

Carried.

Resolution offered by Mr. J. H. Pickerill, of Illinois:

*Resolved*, That agricultural societies should require from their committees a written report stating their reasons for awards.

Lost.

The following definitions, presented by Prof. Miles, in the form of a resolution, were laid upon the table.

Pure bred, full bred, and thorough bred, as animals of a distinct and well defined breed, without any admixture of other blood.

Cross breed, animals produced by breeding together distinct breeds.

Grades, as the product of a cross between a pure breed and a "native."

High grades, an animal of mixed blood, in which the blood of a pure breed largely predominates.

On motion, the question of record of pedigree was referred to a committee of one from each State represented.

The following are the committee:

Wisconsin, Geo. Murray; Missouri, T. E. Talbot; Michigan, D. W. Miles; Maryland, Chas. E. Coffin; New York, Charles F. Wadsworth; Ohio, Edward M. Waddle; Iowa, Dr. Sprague; Kentucky, G. M. Bedford; Indiana, W. W. Thrasher; Ontario, D. Christie; Illinois, C. C. Parks.

The Hall of Representatives having been offered for the use of the Convention, on motion, the Convention adjourned to meet in that place at 7 o'clock P. M.

#### EVENING SESSION.

The Convention was called to order by the President.

W. W. Thrasher inquired in regard to cattle at fairs; spoke of the diversity of opinion in regard to the condition of cattle at fairs, presenting the following:

*Resolved*, That in the opinion of the Convention, overfeeding animals for show purposes is injurious to cattle for breeding purposes.

Harvy Sadowski asks what is a breeding condition? Says he had a fat cow that was very fat and bred well and without any trouble.

Mr. Duncan, of Illinois, answers that no cow is in breeding condition that does not breed. He cited a cow of Alexander's, that did not breed until six years old; afterwards bred well. Also cited another instance of deferred breeding, and by reducing her flesh and breeding her in the spring, she became a producer. Has had as much trouble with cows to breed in low condition as in high.

Mr. Thrasher defined common condition as a condition between two extremes. He had had the best results from cows well fed, and wants cows fat and in an improving condition when they are bred. He said that cows are more likely to breed if fed on dry food. He makes cattle fat only on corn. Cattle ought to be fed from four to six weeks after they are turned on grass.

Mr. Dye, of Illinois, said it is a theory of his that high feeding is productive of barrenness. He can not prove it, however. If his theory is true, then high feeding is not desirable. As to the condition of show cattle, it is a matter of taste. He said that in order to keep one's reputation as breeder, he can afford to sacrifice a few.

Prof. Miles has given attention to high feeding, as he had given some attention to comparative anatomy. He said that cattle possessed the power of digesting or assimilating so much food; that fatty formations are not the result of high feeding. He knows of animals that are fat and do not breed and of poor cattle that do not breed, but in no instance could trace it to high feeding. He claims early maturity to be the most desirable quality of an animal, and asks how this is produced.

Answer—By feeding the young animal all it will eat, you tend to early maturity in a few generations. He said that the highest type of early maturity is only procured by early feeding. In order to attain the highest point of perfection, we must feed.

Mr. Stewart said that the want of fertility in well-fed

cattle is more the result of the kind of feed than the quantity. If our feeders would feed less corn, and thus less starch, and would feed oat-meal or oil-meal, they would have less trouble from barrenness. He said that corn or starch tends to fatty degeneration of the ovaries.

Western feeders feed too much corn. Coarse feed, such as hay or straw is raised and afterwards masticated. It unquestionably pays to cut corn, in order to secure a more perfect digestion of the food. At least one-fourth will be lost if fed whole. The day will come when we will not only cut, but cook the food.

Harvey Sodowsky—My experience in feeding stock is to feed all they will eat one way, then try another way. I feed corn; soak the feed for them; feed oil-meal, and turn on grass—and grass is better than cornstalks—don't think cornstalks are very good feed; calves digest corn better than older cattle.

Mr. Jones, of Ohio, maintains that the question is: Is the tendency to high feed profitable? We can profitably raise a steer to weigh 1,300 pounds at two and a half years old, but it is not profitable to raise steers to 2,000 pounds; but he is satisfied that high feeding tends to barrenness. It is a commonly received opinion that if a cow will not breed it is best to put her on low feed. Do not judges at fairs allow the premium to the fattest animal, and is it after all not the test? We want men to buy our cattle and we must feed high, but the work of breeding is in a measure a philanthropic work. People say that there is nothing in the blood but in the fat. I spent two years in England and verify the fact that the old English breeders do not feed high. Booth, of England, declared not long since that he could not show again, for the fact that many of his leading families of cattle are not productive—that he was forced to high feeding because it was fashionable.

Professor Miles said that putting a cow upon low feed was no evidence of sterility from fatness but that a change of condition was necessary—that the cry of most all with poor stock was that others were too fat.

First, the stomach must be filled in order to keep up the health of the animal. What would pay in Massachusetts will not always pay in the West. Some years since nitrogenous food was said to form muscle, but this theory latterly is disbelieved. At the present time we can make no distinction between muscle forming, and fat forming food.

Mr. Dye asked if the Professor believes there is no difference in the kinds of food. There is a difference in food and there is a difference in animals. Some will thrive best on one kind of food and others on another kind of food.

Mr. Porter said that his experience has been that fat sows do not breed as well as thin ones, and his experience was the same with cattle. The theory commonly received is that fatness does produce barrenness.

Mr. Duncan does not wish his remarks misunderstood. He likes to breed in the highest possible condition, upon the principle that like begets like. It is culture that has produced Short-horns.

Mr. Booth, of England, on being asked if he was not afraid that injury might result from high feeding, replied that it was natural for these cattle to breed in a fat condition. He thought that a continued high condition might shorten the breeding period. No food is so valuable as grass in the pasture.

Mr. Stewart said that food containing much starch is best to lay on fat.

The Convention adjourned to meet at 9 o'clock to-morrow morning.

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## SECOND DAY'S PROCEEDINGS.

The Convention assembled at 9 o'clock, and was called to order by the President.

Mr. Porter offered a substitute for the resolution in regard to the breeding condition of animals, which reads as follows:

*Resolved*, That in order to maintain the present excellence of Short-horn cattle, and bring them up to still greater perfection, it is necessary to feed the animal freely, especially while young, yet, while it is in unquestionably injurious to allow animals to become poor, or even thin, we think it also injurious and dangerous to the fertility of animals, especially bulls, to feed with corn the whole year, so as to keep them in very high feeding, and that judges should discourage excessive fat.

Mr. Sodowsky said it is all tomfoolery to try to restrain men from feeding as they wished. Men will buy the fattest animals.

Mr. Porter said that this resolution will not compel any one to change his method of feeding, yet it will have its influence.

Dr. A. C. Stevenson—If you obtain high prices for cattle they must be fat. Any class of cattle may be fat, but fat is not all that is wanted. Short horns will command a much higher price than common cattle. Good points, good loins and ribs bring good prices. Short horns owe their present value largely to their close approximation to the butchers' wants, and to their being bred in that line of points that please him.

Feeding cattle so high as many do, injures their sale among farmers, who say they are not prepared to adopt such a mode of care and feeding, and it is impossible to disseminate the Short-horns generally through the country, owing to this prejudice. Such teachings must emanate from this Convention, as will satisfy the people that Short-horns are the most profitable cattle to raise. Some of you say that they must be fed winter and summer. Short-horns will winter better than common stock; they will go through the winter on grass and keep in good store condition. He had a bunch of small calves from heifers that roughed it through winter and summer on grass and corn fodder, which were fed the fourth winter ten ears of corn per day and run on grass, and which weighed in the month of April 2,100 pounds average. He thought that Mr. Collins never improved the Short-horns, and in breeding of cattle, can not impart any more qualities to their offspring than their an-

cestors possessed. He did not favor the plan; said we as often attribute the success of breeders to errors, as to the facts in their mode of breeding. The judges at our fairs are often misled. The cattle interest is the great interest of the country. The country is interested in the proceedings of this Convention. The people must be taught to believe that Short-horns are the most profitable cattle.

Mr. Sodowsky said that he did not adopt this high feeding as a rule, but that he must have a few fat ones to show those that come to see his stock. The majority of his herd run on grass winter and summer and are fed in the winter with corn fodder. He had a bunch of Short-horn steers that at two and a half years old weighed two thousand pounds. He had a hundred common stock, and there was from six to seven hundred pounds difference.

Mr. R. R. Seymour, of Ohio, moved the following as a substitute for both the propositions:

*Resolved*, That it is the sense of this Convention that the practice of high feeding animals, for show purposes, is an evil that is detrimental to the breeding qualities of both male and female, and we would recommend a modification of the same as far as practicable.

The discussion was continued at considerable length, the high feeders contending that the injury to health or breeding qualities did not arise from the practice of high feeding, (not over-feeding,) and instanced many facts of continuous and long breeding with animals continually in a high condition.

The whole matter, however, was at length referred to a committee of three to draft some resolution upon which all could agree, the result being the following resolution reported by them:

*Resolved*, That in the estimation of this Convention it is not only necessary in successfully breeding Short-horn cattle, that we should secure animals of fine form, pedigree, etc., but that they should be *well fed* and cared for, at the same time we look upon the practice of keeping up cattle without exercising, and feeding to their utmost capacity, for the purpose of show and sale, as injurious to their health and usefulness as breeders.

This resolution was still further discussed and adopted by a small majority.

The discussion ran into methods or practices of feeding, which showed that the same usages could not be practiced in all sections of the country to equal advantage, the Eastern men advocating the cutting, grinding and cooking of food, while in the West, where hogs were kept, there was economy in the most prevalent way of feeding out corn. It was, however, plainly shown that with the advancing age of the animals, the cutting and steaming of coarse fodder and grain was a great advantage.

#### **PERMANENT ORGANIZATION.**

The Committee on Permanent Organization reported a Constitution, which on motion, was taken up, article by article, and adopted by the Convention :

#### **CONSTITUTION.**

The undersigned, breeders of Short-horn cattle, for the purpose of increasing and protecting this important interest, and to increase the average excellence, and provide for the preservation and dissemination in its purity of the matchless blood, for the improvement of American Cattle, associate ourselves together under the following constitution:

**ARTICLE 1.** This Association shall be known as the American Association of Breeders of Short-Horn Cattle.

**ART. 2.** The officers of this Association shall be a President, two Vice-Presidents, Treasurer and Secretary, who together with one Director from each State, and organized Territory of the United States, and Provinces of Canada, that may be represented by membership in the Association, shall constitute a Board of Directors for the management of the affairs of the Association, subject to this Constitution and such regulations as the Association may from time to time adopt.

**ART. 3.** Any person, or college, or association engaged in breeding Short-horn cattle in the United States, or Provinces of Canada, may become a member of this Association by signing this Constitution and paying the sum of two dollars, and shall be liable to pay such annual sums thereafter as the Board of Directors shall prescribe.

**ART. 4.** The officers and Directors first chosen shall be elected for the term of two years, and until their successors are elected, and memberships in each State and Province not represented at this first

meeting, may, by sending their names and the fees forward to the Treasurer, designate a Director for such State, Territory or Province, whose term of office shall expire at the same time as other members of the Board.

ART. 5. The Board of Directors, of whom nine shall constitute a quorum, shall have power to call meetings of the Association at such time and place as they may deem necessary for the protection of the public against fraud in pedigrees and for the exposure of parties who may be guilty of the same.

They shall likewise have power to publish the transactions of the Association, and to provide means for the payment of all expenses that may be incurred.

ART. 6. This Constitution may be altered or amended at any regular meeting called for the election of officers, by a two-thirds vote of the members present.

#### OFFICERS.

On motion of W. R. Duncan, Dr. A. C. Stevenson, of Greencastle, Ind., was elected president by acclamation.

Vice Presidents—Wm. Warfield, Lexington, Kentucky, and Hon. David Christie, of Paris, Ontario.

Secretary—B. H. Campbell, of Batavia, Illinois.

Treasurer—John G. Dunn, of London, Ohio.

#### DIRECTORS.

Ohio—R. R. Seymour, Chillicothe.

Illinois—W. R. Duncan, Towanda.

Kentucky—E. G. Bedford, Paris.

Michigan—Manly Miles, Lansing.

Wisconsin—George Murray, Racine.

Indiana—Claude Matthews, Indianapolis.

New York—Samuel Campbell, New York Mills.

Iowa—J. H. Bacon, Washington.

Missouri—C. T. Quissenbery, Mexico.

Maryland—C. E. Coffin, Muirkirk.

Massachusetts—Josiah Fogg, Deerfield.

Minnesota—W. S. King, Minneapolis.

Tennessee—M. S. Cockrell, Nashville.

Kansas—G. W. Glick, Atchison.



Nebraska—E. L. Emery, Omaha.

Maine—Warren Percival, Vassalboro.

Vermont—D. S. Pratt, Brattleboro.

Ontario—Stephen White, Charing Cross.

Province Quebec—M. H. Cochrane, Compton.

It had become evident from the commencement of the session, that the great subject to come up was the matter of recording pedigrees. Considerable fault had been found with the editor of the American Herd Book, and some projects were on foot for starting a new book, or providing some other medium than the American Herd Book. The veteran editor, Hon. L. F. Allen, who has published the Herd Book for twenty-five years, was present; and somewhat in the light of a prisoner at the bar, as he expressed it, gave at some length the history of the publication of the noted English Herd Book, also of the American Herd Book, enumerating many of the difficulties that had been encountered in the work, and explaining away many of the charges which had been brought against him as its editor. He stated that his only wish was to publish a perfectly reliable book, and, to so far conform to the wishes of the breeders as was possible, and to be governed so far as practicable by such recommendations as the Convention might adopt. He patiently answered numerous questions, and sustained himself by reference to volumes of the English and American Herd Book, and by documentary evidence.

The opposition was most completely disarmed, and the Convention put themselves earnestly to work on the report of the committee, which had had a very long session in preparing the report.

The following is the report as adopted, after some amendments:

*Resolved*, That for the better management of the American Herd Book in future, the committee make the following recommendations:

*Resolved*, That the name and address of both breeder and owner

shall be given, together with the date of birth and color of the animal.

*Resolved*, That the ancestry of animals should be traced on both sides to imported animals, before they can be entitled to registry.

[Amended by inserting after imported animals,] or those heretofore recorded in the American Herd Book, with correct pedigrees.

*Resolved*, That family names should belong to the breeder first claiming that name in some agricultural paper of the United States or Canada, or in previous volumes of the Herd Book.

*Resolved*, That the person under whose direction the animals are coupled, shall be recognized as the breeder of the produce.

*Resolved*, That a committee shall be appointed by the President and Directors of the Association, whose duty it shall be to examine all pedigrees charged by any member of the Association as errors or forgeries, or any believed to be such, and when decided to be wrong, that the facts be published in a chapter of errors, to be attached to each succeeding volume of the Herd Book.

*Resolved*, That the Hon. L. F. Allen, be requested to continue the publication of the American Herd Book in accordance with the above recommendations.

The second resolution, before amendment, elicited much discussion, the amendment only being carried by a vote of forty-one for amendment to thirty-five against. Mr. Pickrell thought more careful attention should be paid to describing the color of animals in recording pedigrees.

The resolution of Professor Miles, which had been laid upon the table, was taken up. The first item excited a long discussion as to what constituted pure bred and full blood. It seems there was a great diversity of opinion upon the meaning and use of the terms, some of our best breeders using full blood to mean animals of really mixed blood or those of high grade. The whole matter is now finally settled, and these terms are to be used hereafter as synonymous with *thoroughbred*. This will doubtless prevent much confusion and misunderstanding if adopted generally by our breeders.

Mr. A. B. Hostetter, of Mount Carroll, Ill., offered the following preambles and resolutions, which were unanimously passed :

**WHEREAS,** The general government of the United States has made large and liberal appropriations to the respective States for the establishment of agricultural colleges ; and

**WHEREAS,** The live stock interest of the country is of vast and growing importance, and entitled to its just share of such appropriations, with other agricultural interests ; and

**WHEREAS,** Comparatively little is known of the diseases of domestic animals, and their treatment and cure, therefore be it

**Resolved,** That we, the breeders of Short-horns, recommend the establishment of an efficient professorship of veterinary practice in each agricultural college, and that said professorship receive a liberal endowment from the college fund.

**Resolved,** That we invite the breeders of horses and other domestic animals, to unite and co-operate with us in promoting this object.

On motion of C. Matthews, resolutions of thanks to the railroads for courtesies extended the members of the convention, also to the legislature for the use of Representatives' Hall, for holding the convention, were passed.

A resolution of thanks to the President and the Secretary, and his assistant for the satisfactory manner in which they have discharged their duties was adopted.

Mr. J. A. Patterson, of Rock Falls, Ill., offered a resolution returning thanks to the agricultural press for articles favoring the call for the Convention, and pledging the members to assist in increasing the circulation of the same.

Mr. Allen, editor of the "American Herd Book," returned thanks to the members for their confidence in him in the publication of the "Herd Book."

The Convention then adjourned *sine die*.

At the close of the Convention, a meeting of the Board of Directors was held, at which it was resolved to hold the next Convention on the first Wednesday in December, 1874, at Cincinnati.



## ADDITIONAL COUNTY REPORTS.\*

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### KNOX COUNTY.

The Knox County Agricultural and Mechanical Society is a stock association. The amount of stock paid up, for which certificates have been issued, is nine hundred and twenty shares of ten dollars each, amounting to \$9,200.

This county is bordered on the east and south by White river, and on the west by the Wabash river, and has a water front of about eighty miles. The river bottoms are almost continuous, and average about two and a half miles in width. The uplands are gently undulating, with subsoil varying from sand and gravel to compact clay, thus furnishing a variety of soil adapted to the growth of every desirable crop, and which is unsurpassed anywhere for fertility.

This county is also well provided with the best of timber suitable for manufacturing purposes, and is underlayed with inexhaustible coal deposits of good quality. These, together with her railroad facilities for reaching the best of markets, offer to the immigrant farmer of moderate means, and to manufacturers with much or little capital, very great inducements to pitch their tents in "old Knox."

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\*These Reports received too late to come in their proper place.—  
SECRETARY.

Wheat, corn and hogs are our leading staples, though fruits, potatoes and grass have commanded more attention than formerly.

Wheat has long been a leading staple. The varying seasons of a few years ago brought lessened products, that led to better tillage, preparation of ground, and manner of planting or putting in, resulting in increased yields. The better class of farmers are now quite dissatisfied with an average yield of less than twenty bushels per acre; often thirty, and sometimes even forty bushels are produced. The varieties at present most esteemed are English and Tappahannock; quantity of seed sown, one to one and a half bushels per acre; the average yield about fifteen to seventeen bushels. Threshing from the shock is considered the best and most economical method of saving the grain. The price during the season ranged from \$1.30 to \$1.60 per bushel. No remedy for weevil or Hessian fly, except that it is considered beneficial to plow the ground early and sow late.

We have no particular variety of corn. Large varieties of both white and yellow are sought for, the white predominating. The average product for upland is forty bushels; for the river bottoms, fifty-five bushels. The cost of production is about six dollars per acre; price, twenty to thirty cents per bushel.

There is but little attention paid to growing oats, rye and barley, as they are considered unprofitable crops.

Of grasses, the most esteemed for pasture is Blue Grass, and for hay, Timothy. The quantity of seed generally sown per acre is, of Blue Grass, three pecks to one bushel, and of Timothy, seven to nine pounds. The amount of hay produced is from one to four tons; the average about one and three-quarter tons; price, ten to twelve dollars per ton. Red clover is beginning to receive considerable attention as a renovator and recuperator, and for pasture.

The regular dairy business is almost entirely neglected in this county. There is no cheese made, but almost every farmer's wife makes a small surplus of butter for market. I

have no reliable data from which to furnish dairy statistics. The price of butter ranges from fifteen to thirty-five cents per pound.

Of cattle, the favorite kind is the Short-horn. Natives and Durham crosses are considered the best for milk, and for all that is sought for in cattle, the Short-horns stand A No. 1. Cost of raising to three years old, fifteen to twenty-five dollars; usual price at that age, twenty-five to forty dollars; price of cows, spring and fall, thirty-five to fifty dollars.

Large sheep, and medium to long wool is considered most profitable for mutton or fleeces, and where land is as low in price as it is here (the worthless Newfoundland and cur not considered), wool-growing is certainly one of the most remunerative pursuits the land-owner could engage in.

The favorite breed of hogs is the Magie, or cross between the Poland and Big Bone China, though the Chester White and other large breeds have their particular friends, and a few are partial to the smaller breeds, as Berkshire, etc. The methods of curing pork and bacon are too various to mention, though the old way of bulking and smoking is most practiced, and probably considered best. Price of pork, about five cents; bacon, seven to 12 cents.

Until the last few years potatoes were comparatively neglected, but they are now beginning to receive considerable attention. This year early potatoes were a fair crop, the late ones were nearly a total failure, owing to the severe drouth of the latter part of the season. A great many varieties are grown, but those considered most profitable are Early Rose, Shaker Russet and Peach Blow. The common system of planting is in drills. Manuring is scarcely at all practiced, and not at all considered necessary for profitable crops. The yield ranges from 100 to 250 bushels, the average is probably 160 bushels. Cost of production about twenty-five cents per bushel. Price this season, fifty to sixty-five cents.

Fruit culture is beginning to receive a due share of attention. Apples, Peaches, Pears, Grapes, and in fact all the

different kinds of fruits adapted to this latitude produce very satisfactory results where proper care and attention is given them. It is hard to say what varieties of fruits are best adapted to our soil, or most valuable, as the soil is so varied, that one variety is considered best in one locality and another in the next. Of apples, we might name for late summer or early autumn, Maidens' Blush and Fall Wine. As a fall apple, the Rambo is most popular. Of winter apples, the Wine Sap probably has the preference, while the Yellow Bellflower, Rome Beauty, Smith Cider, Hoop, Pennock, Ben Davis and others, are quite popular. Of peaches, Hale's Early on sandy and Troth's Early on clay soils, are probably the most popular early, and Heath Cling for late, while several varieties are quite popular for the middle of the season. The crop of peaches was large this year, too large to be of first quality; the apple crop was considerably below an average, both as to quantity and quality. The price of apples ranges from fifty cents to one dollar per bushel.

Of forest trees we have a large variety. The principal kinds, on the uplands are the several kinds of Oak, Hickory, Poplar, Beech, Sugar Maple, Soft Maple, Elm, etc., with a smaller or under growth of Sassafras, Red Bud, Papaw and Hazel, and in the bottoms, White and Black Walnut, Burr and Red Oaks, Hackberry, Sweet Gum, Hickory, Elm, Maple, Lynn, Sycamore, etc., with a smaller growth of Sassafras, Red Bud, Papaw, Spice-brush, etc.

I have no reliable statistics of the amount or value of the staple products.

There is in this county but a small area of really hilly land, but there is a large amount of level and wet lands. The population not having been dense enough to demand its reclamation, and with a scarcity of surplus capital, but little attention has been directed to draining or reclaiming the latter. The only method in use to any extent, is open ditches.

Farmers in this county are gradually working into better system and more thorough tillage of the soil, and are getting pretty well supplied with improved implements. The present stock of hogs is very good; of horses it is pretty fair; we



have some very good and improved cattle and sheep, but there is abundant room for the improvement of the general stock of the county. The interest in this direction is being awakened, and we hope to accomplish much in that direction with the aid of our society and fairs, and it is fairly presumable that it is exerting a valuable influence in the good work.

The second annual fair was held on the Fair grounds of the society, near the city of Vincennes, October 15th, 16th, 17th, 18th and 19th, 1872. The society offered \$2100 in cash premiums, which was increased by the business men of Vincennes, and the county, offering \$400 in special premiums in addition to the regular list. Considering the season, the excitement attendant upon a State and Presidential election, our fair was a reasonably good success, the receipts of the fair proper were \$4,615.55 against \$3,334.35 last year, the competition for premiums was good, the exhibition in nearly all the classes was better than could have been reasonably expected. The agricultural department was a fine show, both as to quality and quantity, though the late date of holding our fair precluded the exhibition of a large number of farm, garden, and orchard products.

The number of entries was considerably increased, as will be seen by the statement below, compared with last year's entries :

Class.	DEPARTMENT.	Entries 1871.	Entries 1872.
1	Agricultural Implements and Machinery	73	50
2	Mechanical.....	54	30
3	Fruits.....	42	52
4	Field Crops and Garden Products.....	65	80
5	Farm Products.....	68	158
6	Ladies' Work, Domestic Manufacture...	83	79
7	Machine Manufacture.....	1	16
8	Home Manufacture, Hand Work.....	29	28
9	Flowers, Paintings, etc.....	62	60
10	Canned Fruits, Jellies, etc., Preserves...	162	339
11	Dairy and Pantry.....	56	111
12	Poultry.....	17	28
13	Boys' and Girls' Riding Rings.....	4	45
14	Speed, County Rings.....	6	14
15	Horses, Light, Harness and Saddle .....	33	43
16	Gents' and Ladies' Riding Rings .....		12
17	Draft Horses and Mules.....	30	26
18	Cattle.....	39	35
19	Sheep .....	9	26
20	Hogs.....	36	66
21	Horses, General Purposes.....	50	76
22	Sweepstakes.....	74	71
23	Miscellaneous .....	22	22
	Total .....	1015	1467

The receipts and expenditures of the Society for the past season are as follows :

## RECEIPTS.

From sale of Gate Tickets.....	\$2,635 60	
From sale of Amphitheatre Tickets...	244 50	
From Entries.....	412 95	
From sale of Booths and Spaces.....	871 75	
From sale of Stalls, Express Permits, etc.....	50 75	
From Special Premiums.....	400 00	
		<hr/>
		\$4,615 55
From County Agricultural Fund.....		70 00
Stock paid.....		400 00
		<hr/>
Total .....		\$5,085 55

## EXPENDITURES.

Paid for Improvements.....	\$1,875 27	
Paid for Labor, Police, Officers and sundries .....	1,018 37	
Paid Premiums awarded.....	1,953 00	
		<hr/>
Total.....		\$4,846 64
		<hr/>
Balance in favor of the Society.....		\$238 91

The improvements made on the grounds are, a permanent dining hall with cook-room attached ; an office ; booths under amphitheatre ; additional stalls for horses and cattle ; sheep and hog pens, and other etceteras too numerous to mention.

Our grounds are a level field, without the necessary shade trees, and our fairs are necessarily held later in the season than if we had shade to protect us from the sultry heat of a September sun ; but it is the intention to plant trees the coming winter and spring, and in a few years we intend to have as elegant a fair grounds and park as any in the State.

E. R. STEEN,

*Secretary.*

## UNION DISTRICT.

LOOGOOTEE, Ind., Nov. 11th, 1872.

I have the honor herewith to submit the annual report of the first fair of the Union District Fair Association, held at the Society's grounds near this place. The society was organized in the latter part of spring, which gave but a very short time to fix for the fair; but owing to the lively interest which the citizens took in the matter, we bought forty acres of beautiful ground, all in the woods, and on the 1st day of last October everything was in good running order. We had sunk three wells, which furnished an abundance of good water, and dug a very large pond; built two halls, one mechanical and agricultural and one floral; one hundred and fifty horse and cattle stalls, 35 boxed, with doors and locks; one hundred hog and sheep pens; and trimmed up the trees of the entire forty acres; graded a half-mile track for the exercise of horses; with a judges' stand to command a view of the finest track in this portion of the State. We have also fenced the entire ground with a good picket fence on three sides, the other a close fence, eight feet in high. The situation of the land is in Daviess county, north of the Ohio and Mississippi Railroad, running back to the Washington and Loogootee road. The District is composed of Martin, Daviess, Greene, and Dubois counties. The fair for the first year was a decided success.

Whole number of Entries.....	593
Total Amount of Premiums Paid.....	\$1,501 75
Total Receipts.....	\$6,061 30

JOHN I. QUIGLEY,  
*Secretary.*

## DAVIESS COUNTY.

This Society was organized on the fifth day of November, 1870, on the joint stock plan, in shares of ten dollars each. Six hundred and fifty shares have been subscribed and three hundred and fifty-three shares have been paid in full. In the spring of 1871, the Society purchased forty acres of land within one-half mile of Washington and enclosed twenty-eight acres of the same with a substantial plank fence, seven feet high; and erected on the grounds a floral hall 32 by 65 feet, a dining hall 30 by 50 feet, a mechanical hall 32 by 62 feet, Treasurer's office, Secretary's office, Judge's stand (octagon in form), one hundred and fifty-seven horse and cattle-stalls, sheep and hog pens, and other necessary fixtures. Five wells were sunk on the grounds and provided with pumps. A beautiful grove of forest trees covers about fifteen acres of the grounds, affording ample shade without obstructing the view.

The Society held its First Annual Fair September 26th to the 30th inclusive, 1871, and was a very successful exhibition. The attendance was large and the receipts from all sources amounted to about \$2,700.

The Second Annual Fair was held September 23d to 28th inclusive, 1872. The exhibition in the various departments was much better than last year, although, perhaps, the average attendance was not quite so large. The exhibition of horses, cattle, sheep and hogs was quite an improvement over last year in both quality and numbers, and gave evidence of the fact that our farmers are interested in the raising of improved breeds of stock. The display of farm products, fruit, minerals and machinery was meritorious and showed well for the industry and enterprise of our citizens. The floral hall was well filled and was an attractive feature of the Fair. The exhibition of domestic manufactures, millinery goods, fancy needle-work, crotchet and tapestry-work was much better than last year. Great credit is due to the ladies

of the county for the interest they have manifested in the success of our Society.

In the future we hope to be able to offer larger premiums on such articles as are usually exhibited by ladies that we may, to some extent, compensate them for their trouble. Over two thousand dollars were offered as premiums.

Everything passed off agreeably, and exhibitors and visitors were generally well satisfied. Already the legitimate fruits of a well-conducted County Agricultural Society are to be seen, and the members of the society are encouraged to renewed efforts in the future.

#### RECEIPTS.

On stock subscriptions.....	\$1,168 55
From Secretary (entry fees, etc.).....	552 25
From sale of tickets.....	1,692 35
From County Treasurer (license fund).....	95 00
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Total receipts.....	\$3,508 15

#### EXPENDITURES.

Printing bills .....	\$142 00
Lumber bills.....	422 69
Labor bills.....	652 85
Premiums paid, 1872.....	1,440 00
Premiums paid, 1871.....	101 00
Labor bills, 1871.....	374 40
Cash on hand.....	375 21
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	\$3,508 15

The balance on hand was ordered paid on the outstanding indebtedness of the Society. There is quite an amount yet due on stock subscriptions which is being collected from time to time as suits the convenience of the subscribers.

The soil of the county is river bottom, sand and clay loam, and is well adapted to the growth of corn, wheat, oats, flax, barley, vegetables and all the grasses. The upland is remarkably well adapted to the growth of clover.

The principal kinds of timber are: Poplar, black-walnut, white-walnut, black-oak, white-oak, sugar-maple, soft-maple, hickory, beech, locust, mulberry, elm and ash.

Clover, timothy and red-top are regarded as the best grasses for hay, and bluegrass the best for pasture. Red-top grows in great luxuriance and when properly cured, makes good hay. The flat lands adjacent to the small streams produce an excellent grass for early and late pasture.

The varieties known as the Black Mediterranean, Big English and Hill wheat are considered the best. The Black Mediterranean is much esteemed by many farmers, and is thought to be less liable to injury from the fly or rust than many other varieties. The wheat is generally drilled, and from four to six pecks of seed used per acre, and the yield from ten to twenty-five bushels per acre. The yield, of course, depends very much on the season and the way in which the wheat is put in. Late seeding is regarded as about the only preventive against the fly. Our farmers sow wheat from the middle of September to the first of November. The average price during the season is \$1.30.

The Berkshire, Poland and Chester White, and their crosses are considered the best breeds of hogs, and are fast taking the place of the inferior and native breeds.

There is a large amount of wool grown in this county, and wool-growing is considered a profitable business when the sheep are not molested by dogs. We have a variety of breeds. The Cotswold is regarded as the best on account of the amount of wool they produce, and their large size makes them profitable for feeding.

The Early Rose and Early Goodrich are the most profitable varieties for early potatoes and the Peachblow, Shaker-Russett and Prairie Flower for late potatoes. Potatoes are generally planted three feet apart, manured in the hill after planting and cultivated both ways. With a favorable season and proper cultivation the yield is from 150 to 250 bushels per acre. The average price during the present season was eighty cents per bushel.

This section of country being well adapted to the growth

of fruit, there are a great many varieties being propagated. Prominent among which are the Early Bow, Maidenblush and Truston Early, for summer use; and the Winesap, Baldwin, King of Tompkins County, Yellow Bellflower and the different varieties of Pippins for winter use and exportation.

Judging from the number of fruit trees annually sold in the county and the character of the nurseries they are taken from, it will not be long until we will have an abundance of good fruit. The peach, pear and cherry, so uncertain in many places, do well her.

Our farmers are, from year to year, adopting a more thorough system of farming, bringing into use the most approved kinds of farm machinery, and are giving special attention to the rotation of crops; the growth of clover as a fertilizer; and are making liberal use of the manure made on the farm. As land increases in value, more attention will be given to the draining of wet lands; and other improvements will be made. At present the draining is done by open ditches, tile draining having not been introduced as yet. To insure the introduction of any new article among our farmers it is only necessary to prove its utility.

There is no place in the West that offers greater inducements to manufacturers than the city of Washington, situated as it is half way between Cincinnati and St. Louis, on one of the principal thoroughfares between the East and West, having a population of four thousand, which, with the business of the city, is rapidly increasing. Our county is finely timbered with the most valuable timber for manufactures of every description. Our coal fields are co-extensive with the county. The coal consists of three or four kinds, all of superior quality, and can be furnished to consumers at a small per cent. over the cost of mining. We have now in successful operation two sash and door factories, one pump factory, one foundry and machine shop, two carriage shops, three wagon shops, two woolen factories, three flouring mills with a united capacity of four hundred barrels per day, one shingle and stave factory and other smaller manufacturing establishments. There are about twelve coal mines in active opera-



tion in close proximity to the city that are doing an extensive business, giving employment to a large number of hands.

Washington is improving rapidly in every respect. Buildings are constantly going up, and yet the sign "for rent" is never seen. Washington is destined to be an inland city of considerable importance.

J. M. HAYNES,  
Secretary.

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## MARSHALL COUNTY.

This county has probably more good land in proportion to its area than any county in the State. It contains 440 square miles. There is an abundance of the finest timber, of nearly all varieties, except the resinous woods, and almost every variety of soil. The valley of Yellow river is one of the finest and healthiest climates in the world. Devastating storms are unknown, and a general failure of crops has never occurred. The Kankakee river on the west about 18 miles, the Tippecanoe on the east and south about the same distance, the St. Joseph on the north and north-east about 24 to 28 miles, and Lake Michigan about 42 miles to the north and north-east, with high lands between, may have something to do with our pleasant climate. The soil is fertile and yields abundantly. Fruit thrives well and there is the best of pasturage for cattle. The entire east half of the county, the north part and a portion of the south is heavily timbered land, or was, being now extensively cleared up into fine farms; while the residue is heavy and light barrens, with more sandy and clayey soil, but producing certain and fair crops. Wild grass lands are found in all parts of the county, producing abundance of hay and pasturage. There is no water-power of much value, no minerals worth working, no stone except "niggerheads," but plenty of good water.

Its railroad facilities are abundant and its nearness to good markets all that can be desired. Grain, fruit and vegetable crops will do to boast of, and in swine it can compete with any locality ; but in cattle, horses and sheep it has no record and its people have made no efforts worth notice. The lumber and timber trade, conducted in a loose manner, and without the investment of any capital, has afforded employment to many hundreds of men and teams, and agricultural interests have pleaded for attention in vain.

A Joint Stock Association was organized last April and held a Fair on the 25th, 26th and 27th days of September which would have been a credit to any county, had it not been for the poor display of cattle, sheep and horses. Its exhibitions of grain, fruit, vegetables and all kinds of farm and garden productions were extraordinary and seldom surpassed. In domestic manufactures, table comforts and domestic works of art, it was highly creditable. In swine, it was beyond rivalry. In trials of speed, it was respectable, the time on trotting for double teams and single horses ranging from 2.45 to 3.05.

The receipts and assessments on stock will pay all expenses and floating debt, and with proper encouragement it can be made to take rank with the most famous societies in the country.

The successful competitors at the Fair for premiums on farms were George York, D. S. Conger, John Jacoby, and D. L. Gibson.

The Society has purchased additional land and now owns 20 acres within a half mile of the Court House, with a creek and river on two sides and with timber for beautiful groves, promenades, etc. They will prepare a first-class race track and beautify the grounds for a public park to be used on all festive occasions.

Prominent farmers of this county and the Western part of Kosciusko county organized an association called the "Pioneer Club." They met at stated periods and held discussions on subjects connected with agriculture. In October they held a Fair, one day, near the Eastern county line, after

a week's notice. The exhibition would have done credit to any county in the North, in all departments, including stock and trials of speed. Some fine cattle are raised in Kosciusko county and with some good horses, including the Norman stock, or French Dilligence horse, were on exhibition. The "Pioneer Club" deserves much credit, and the thanks of the people resident, for its enterprise.

In the south part of the county they have a local association at Argos, and have had one very creditable exhibition. It is in one of the very best portions of the county and contains the elements of a successful Association. It is to be hoped that more local associations will be organized and that a union for an annual exhibition, under the management of the Marshall County Agricultural Association, will make the Marshall County Fairs as noted as those of any other county in the West.

The second annual election of the Association under the new organization resulted in the retention of the former Board, and they will exert themselves to place the Association on a firm basis and in a progressive condition. The Directors hope to be able to report, next year, not only a successful annual exhibition, but a statistical table, showing the entire productions and wealth of the county.

C. H. REEVE,  
President.

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## WARRICK COUNTY.

Our organization was formed in the year 1856 and held our Fifteenth Annual Fair on the grounds belonging to the Association, situated near Boonville, from the 8th to the 12th of October, 1872.

The Fair grounds contain more than twenty acres, all inclosed, with ample accommodation in the way of sheds,

stalls and pens for all kinds of stock and whatever product or article that may be brought for exhibition; also, a dining hall and a large amphitheater sufficient to accommodate five or six thousand persons. We have an excellent circular track, one-half mile in length, for fast horses.

At the close of the last Fair, the Society borrowed \$190 to pay off all indebtedness. The amount borrowed has been paid off and we have money enough on hand to pay off all indebtedness. We intend to make considerable more improvements to beautify our Fair grounds and make them more comfortable and pleasant.

#### RECEIPTS.

Cash on hand from last year.....	\$106 32
Cash received from membership.....	634 00
Cash received from sale of tickets.....	857 80
Cash received from entry fees.....	299 25
Cash received from show and huckster stands.....	452 10
	<hr/>
	\$2,349 47

#### EXPENDITURES.

Cash paid out as per vouchers.....	\$621 40
Cash paid on premiums.....	1,260 00
	<hr/>
	\$1,881 40
	<hr/>
Cash on hand.....	\$468 07

The varieties of wheat are various. The most in use are White Mediterranean, Amber or Alabama. The quantity generally used is about one bushel to the acre when sowed broadcast, and perhaps something less when put in with a drill. The average yield per acre has been, for this year, about fifteen to eighteen bushels though much larger amounts have been raised. In some instances as much as thirty to forty bushels have been harvested from an acre. The crops have been secured by using both reaping machines and grain-cradles. I have not heard of any being reaped

with the old-fashioned reap-hook. The price for the new crop has ranged from \$1.25 to \$1.60 per bushel. The Hessian fly and weevil have done but little damage comparatively for the last several years, and do not know that any remedies have been used for them.

The varieties of corn used are white and yellow of the large size. The average yield is from thirty to forty bushels per acre on the river bottoms. On rich upland the average yield will be considerably above that amount. The crop has not yet been harvested, but it is above an average yield. The cost of producing is about \$5.75 per acre. The prevailing price is about forty cents per bushel.

A greater crop of oats than usual has been raised this season. About thirty bushels per acre would be an average yield for this season. The crop is worth about 25 cents per bushel. Of rye and barley not enough was raised to deserve notice.

Timothy is the favorite grass for hay. We sow from one-sixth to one-fourth of a bushel to the acre. The average yield is about one and a half tons per acre. The price for loose hay is about \$12 per ton. Baled hay at the Ohio river is worth \$14 to \$18 per ton.

Our market is supplied with butter from the farming community, who are not specially engaged in the dairy business. Our cheese is principally obtained from other States. We pay from 20 to 25 cents per pound for it at retail, and from 20 to 40 cents per pound for butter, according to the season and quality.

The favorite kind of cattle is the Durham breed.

There are a great many of the common stock sheep in this county yet; but there is a growing interest in the better grades. The South Down, Cotswold and Leicester breeds are creating general interest in the sheep line. A cross of the South Down with the Cotswold is considered as good, if not the best. Coarse wool is mostly used here. There is not machinery in this county for using up fine wool. Wool-growing, to a small extent, is profitable. It might be on a large scale, if the experiment was tried. The fear of dogs

killing sheep is a great drawback to the wool-growing interest.

Chester White hogs are considered the best by most hog-raisers. Bacon has sold during the season from 8 to 12½ cents per pound for hams at retail; shoulders and sides for something less.

There are several varieties of potatoes and each has its admirers. While some prefer the old-fashioned Pink-eye, others prefer the Neshannock, the Early Rose, the Mercer and others. Various are the ways and times of planting and cultivating. The manuring is left out, except in garden patches. The average yield is not known. Potato bugs have done much damage to the crop for the last two or three years. The Colorado bugs made their appearance here in considerable numbers this summer. A few were noticed last year. We are fearful they will prove to be as great a pest as the common potato bugs. The price has ranged from 50 to 80 cents per bushel for Irish potatoes.

Sweet potatoes are cultivated to a considerable extent and have sold in the market at prices ranging from \$2, for very early, to 50 cents per bushel at present.

This has not been a good season in this county for apples. Blight damaged them, to a great extent, in the spring, and later in the season they took bitter-rot, and many fell off before maturing. Winter apples are scarce. Peaches and other kinds of fruit did well. The varieties are too numerous to mention.

The soil is generally loose, rich and deep, and we think will equal any in the State for productiveness for almost all kinds of crops. Wheat, corn, oats, potatoes, tobacco, grass and many others are the kinds of crops our soil is capable of producing in great abundance.

The kinds of timber are very numerous. Some of the most common are White Oak, Black Oak and almost all of the other kinds of oak, Black Walnut and White Walnut of large size, Poplar, enormously large, Ash, Hickory of several kinds, Sweet Gum, Black Gum, Elm, Hard Maple, Soft Maple, Lynn, Buckeye and many other kinds.

Building stone and coal in great abundance. Enterprising farmers are doing and have done a great deal of ditching, individually, where there are much wet lands.

The number of acres on the tax duplicate is 248,019 and valued at over two and a half millions of dollars, which is not much, if any, over half its real value at this time. The value of improvements is not less than one million dollars. Personal property is considered worth two and a half millions of dollars. The real value of lands, improvements and personal property is not less than eight or nine millions of dollars.

**ROBERT TAYLOR,**  
Secretary.





## STATE BOARD, HOW CHOSEN.

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The Indiana State Board of Agriculture consists of sixteen members, chosen from the following Districts:

1st District—Posey, Vanderburgh, Gibson, Warrick and Spencer Counties.

2d District—Pike, Dubois, Martin, Daviess, Knox and Sullivan Counties.

3d District—Perry, Crawford, Harrison, Floyd and Washington Counties.

4th District—Orange, Lawrence, Jackson, Monroe, Greene, Brown and Scott Counties.

5th District—Clark, Jefferson, Switzerland, Jennings, Ohio and Ripley Counties.

6th District—Dearborn, Franklin, Decatur, Bartholomew and Rush Counties.

7th District—Johnson, Shelby, Morgan and Marion Counties.

8th District—Owen, Clay, Vigo, Parke and Vermillion Counties.

9th District—Putnam, Hendrick, Montgomery and Boone Counties.

10th District—Fayette, Wayne, Union and Henry Counties.

11th District—Randolph, Delaware, Madison, Hancock, Hamilton, Tipton and Jay Counties.

12th District—Clinton, Fountain, Tippecanoe, Warren, Benton and White Counties.

13th District—Blackford, Grant, Huntington, Wells, Adams, Wabash and Howard Counties.

14th District—Carroll, Cass, Miami, Fulton, Pulaski, Jasper, Porter and Lake Counties.

15th District—Marshall, Laporte, St. Joseph, Starke and Elkhart Counties.

16th District—Allen, LaGrange, Whitley, DeKalb, Noble, Steuben and Kosciusko Counties.

Chosen for two years, one-half of whose terms expire each year, to wit: those representing the first, second, third, fourth, seventh, fourteenth, fifteenth and sixteenth expired at the annual meeting, 1860, and those representing the fifth, sixth, eighth, ninth, tenth, eleventh, twelfth and thirteenth districts, expired at the annual meeting held January, 1861.

THIRD AND FOURTH  
ANNUAL REPORTS  
OF THE  
Geological Survey  
OF  
INDIANA,

MADE DURING THE YEARS 1871 AND 1872,

BY  
E. T. COX,  
STATE GEOLOGIST,

ASSISTED BY

PROF. JOHN COLLETT, PROF. B. C. HOBBS, PROF R. B.  
WARDER, AND DR. G. M. LEVETTE.

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INDIANAPOLIS:

R. J. BRIGHT, STATE PRINTER.  
1872.



OFFICE OF STATE GEOLOGIST,  
INDIANAPOLIS, INDIANA,  
December 1st, 1872.

*To the Honorable President and Members of  
the Indiana State Board of Agriculture:*

SIRS:—I herewith submit to your honorable body my  
Third Report of progress in the Geological Survey of the  
State, embracing observations made during the years 1871  
and 1872.

Very respectfully,  
E. T. COX,  
State Geologist.



## INTRODUCTION.

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It gives me pleasure to be able to note the continued prosperity and rapid extension of our mining and manufacturing industries. Districts that were but yesterday covered by a primeval forest, or only broken here and there by the quiet pursuits of the husbandman, have been awakened by the whistle of the locomotive and the puffs of the stationary engine; coal-begrimed miners throng the streets of mining villages of a year's growth, and the work of mining and shipping coal is pushed forward with an energy and zeal that is unprecedented in the West, and far outstripping the hopes of the most sanguine utilitarian.

The number of mines in the block coal region have greatly increased in all the counties, and it is gratifying to know that the demand for coal is still greatly in excess of the supply.

The benefits derived from this invaluable fossil fuel are not confined alone to the limits of the coal field, but by means of the numerous railroads which penetrate its domain, all parts of the State, as well as the leading cities of the neighboring States—Chicago, St. Louis, Cincinnati and Louisville—have their manufactures stimulated by this most valuable of all minerals.

At the present rate of progress of mining in Indiana, a few more years will develop an endless chain of mines over the entire area of the coal field from Warren county on the

north to the Ohio river on the south, with a belt of blast furnaces girdling the zone of block or iron-smelting coal.

The old iron furnaces are all in blast and making good yields of iron. Arrangements are being made to build a new furnace to be placed beside the Brazil furnace, which is to be blown by the machinery originally designed to run two stacks. Another is to be built at Terre Haute by the Vigo Iron Company, and one has already been built at Shoals, in Martin county, which will use, principally, the native ore referred to in my Report of 1870. This ore occurs in great abundance in Martin county, and the semi-block coal found in Sampson Hill, a short distance southeast of Shoals, will supply it with fuel.

It is also highly satisfactory to know that, by making known the extent and economical value of the minerals, the Survey has had the effect to stimulate mining and manufacturing interests wherever it has been carried. I might further illustrate this by citing the increased activity in mining operations which it has brought about in Daviess county. At Washington, in this county, mines have been in operation since the opening of the Ohio & Mississippi Railroad in 1856, and the business had grown to fair proportions, but I think it may be said, without fear of exaggeration, that coal mining has received an impetus and operations in that line have increased with a rapidity heretofore unknown. Lands which were rated at fifty and one hundred dollars per acre have advanced to two and three hundred dollars per acre, and capital from various parts of the country has been turned to this county for profitable investment. Instead of having their mining operations restricted to one seam—the “Washington coal”—the Survey has pointed out the existence of not less than eight distinct seams, five of which are, locally, of workable thickness.

The following named counties have been surveyed in detail: Perry, Dubois, Pike, Parke, Dearborn, Ohio and Switzerland, and a preliminary examination has been made in Wabash, White, Jasper, Howard, Huntington, Miami, Cass, Carroll, Clark, Harrison and Crawford counties.



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In the prosecution of the work I have been assisted by Prof. John Collett, Dr. G. M. Levette, Prof. R. B. Warder and Prof. Barnabas C. Hobbs.\*

Considerable attention has been given to the analysis of coals and other minerals, in order to be able to make known their true commercial importance and to point out the various uses to which they may be applied.

I take this opportunity, also, to acknowledge my obligations to the following named railroads for favors extended to me in the way of annual passes and for uniform courtesies tending to promote the interests of the Survey :

Indianapolis, Peru & Chicago Railway.

Pittsburg, Cincinnati & St. Louis Railway.

Indianapolis, Cincinnati & Lafayette Railroad.

Jeffersonville, Madison & Indianapolis Railroad.

Indianapolis & Vincennes Railway.

St. Louis, Vandalia, Terre Haute & Indianapolis Railroad.

Indianapolis & St. Louis Railroad.

Cincinnati & Terre Haute Railway.

Evansville & Crawfordsville Railroad.

Louisville, New Albany & Chicago Railroad.

Fort Wayne, Jackson & Saginaw Railroad.

Illinois Central Railroad.

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\*Prof. Hobbs was employed at the request of the Commissioners of Parke county, and a special appropriation was made in that county to pay for his services, as I was not willing, having already made a general report on this county, to spend further time and money there before visiting counties which had as yet received no attention.



# GEOLOGICAL REPORT.

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Since the publication of the second volume of my Report on the Geology of Indiana there has been a very great increase in mining operations over the entire area of the coal field, especially along the lines of railroads.

The reputation of the "block coal" for smelting iron ores continues to be fully sustained by its excellent behavior in the blast furnaces that are using it. By making changes at the Brazil Furnace, such as replacing the circle and belly pipes with others of much greater capacity, and putting up gas flues fifty inches in diameter, lined up with fire brick, the yield of this furnace has been increased by four hundred tons per month. She went into blast in October, and during the first thirty days has made one thousand and eight tons of foundry iron especially suited for the manufacture of Bessemer steel. These important improvements were brought about by E. C. Garlick, one of the managers of the furnace.

Mr. Hicks, the intelligent founder, assures me that the furnace now runs with the utmost regularity and he finds no difficulty in making a uniform grade of grey pig.

The Brazil Furnace is sixty-one feet high, fourteen feet across the boshes and is closed at the top. I take pleasure in calling attention to the immense success of this furnace from the fact that it has had a reputation of behaving very badly, and it is to be hoped that it will now not only win an enviable name, but lead the way to still further improvements in furnaces using block coal for fuel. The want of

water which has been experienced at this furnace during the last two seasons of unusual drouth has now been completely obviated by conveying it in cast iron pipes buried beneath the frost line from Otter creek to the furnace.

An account of the new furnace which has just been completed by the Southern Indiana Coal and Iron Manufacturing Company, on the Ohio & Mississippi Railroad near Shoals, in Martin county, Indiana, B. F. Devol, President, and Salem P. Town, Secretary, is given in the following letter received from Cyrus Mendenhall, late of the Kenton Furnace, Newport, Kentucky, and now a member of this new company :

SHOALS, IND., Nov. 12, 1872.

E. T. Cox, *State Geologist* :

*Sir*—Yours of 31st ult. has been referred to me for a reply. I regret that it has been out of my power to do so earlier.

Our blast furnace is, in size, thirteen feet across the boshes, fifty feet high, with close top like the Kenton Furnace of Newport, and has complete arrangements for heating the boilers and hot blast with the waste gases. The shaft is supported on pillars and has an iron casing lined with fire brick. The furnace is blown with six tuyeres. We have two hot-air stoves of most approved construction. The machinery is all horizontal; steam cylinders twenty-eight inches in diameter and eight feet stroke, with a heavy fly-wheel twenty-two feet in diameter. Blowing cylinder sixty inches diameter with the same stroke as steam cylinder, which works it by direct action. The engine is regarded as a very good one and has a bit of history connected with it. It was captured by the United States authorities from a blockade runner in the Gulf of Mexico, during the late war.

The engine house is of frame, twenty-five by seventy-five feet, and contains, besides the blowing machinery, a separate engine which draws our supply of water from Beaver creek

and distributes the same over the works, including the filling of a tank on top of the elevator that supplies a water-balance for hoisting stock to the top of the tunnel of the furnace. Frame stock house, seventy-two by seventy-five feet, calculated to accommodate a second furnace.

Our furnace is now finished, except attachments of pipes to and about tuyeres, etc., and we have fire in it to-day to warm up, and expect to "blow in" next week. We are receiving iron ores from Iron Mountain and Iron Ridge, Missouri, and from our own mine on Webster's Hill, on the east side of the township, with which we are connected by a side-track from the Ohio & Mississippi Railroad. This bank of ore is over forty-two feet in thickness where it has been opened or uncovered, and the deposit seems to extend around the hill. You are acquainted with the character of the ore and we think it rather improves as we blast into it.

The Sampson Hill coal seam is forty inches thick; we have penetrated it with two entries, about one hundred and twenty yards each, and find the coal of remarkable purity. We are also driving an entry on seam A, at the foot of the hill near the county road, on southeast quarter of section 32, same township; this seam is not so thick as the Sampson Hill, but of very similar character.

A visit from you would be most welcome, and we would take pleasure in giving you such additional information as obtained by recent work in this vicinity.

Yours truly,

CYRUS MENDENHALL.

The rapid increase in the demand for Indiana block coal in Chicago, St. Louis, Cincinnati, Louisville and Indianapolis, without mentioning the numerous cities of less population but large consumers of the fossil fuel, and the consumption on the various railroad lines already constructed, points very clearly to a necessity for more roads from the large manufacturing centers to the coal field, which will not only give additional facilities for opening mines, but, by increasing competition in freights, have the two-fold ten-

dency to lessen its cost as well as to secure a more steady supply. With a view to accomplishing this end, a number of railroad lines have been proposed. On some of them work has been commenced, and others are in part completed.

Of the projected roads that will traverse the coal field, I desire to make brief mention and note their progress toward completion :

The Indiana North & South Railway, E. B. Thomas, President.—The northern division of this road is designed to run from Bloomfield, in Greene county, through Brazil and Carbon, in Clay county, Rockville, in Parke county, and Attica, in Fountain county, to Oxford, in Benton county, on the road running from Lafayette to Chicago via Kankakee, where connection will, for the present, be made with Chicago. This road has been graded from Brazil to within a few miles of Rockville, and is completed and running from Veedersburg, at the crossing of the Indianapolis, Bloomington & Western Railway, to Attica, on the Toledo, Wabash & Western Railway.

Along this completed line, in Fountain county, several shafts have been sunk and adits run to the block coal seam I, and mining operations have been commenced, and villages have sprung into existence like magic. The mines at Kirkland station are new, but the work of driving entries has proceeded so far that they are enabled to deliver four to five car loads of coal per day. Two miles above Veedersburg, a side-track is being laid to Lucas & Co.'s mine, and one and a half miles south of the crossing, Spears & Co. have opened a mine by running an adit on the seam, and are hauling considerable coal to the railroad.

The existence of this seam has also been proved by a bore at Veedersburg.

Joseph E. Young, of the Chicago, Danville & Vincennes Railroad, has organized a branch road from Young's station, on the main line, to run through Covington, in Fountain county, thence south down the valleys of Coal creek and Wabash river to Montezuma, in Parke county, thence up the Raccoon valley and across the table land to Brazil. The

rails have been laid on the division south of Covington to Snoddy's Mill on Coal creek, and, keeping pace with the progress of the road, extensive mining operations have been instituted at that point by Messrs. Phelps & Co. and Messrs. McClelland & Co., and the business of mining is already one of great importance to the community.

At Silver Island, a few miles south of Snoddy's mill, on property owned by Norbourn Thomas, is the Silver Island Mine. This coal is a semi-block, and now finds its way to market by the Wabash & Erie Canal. When it is reached by the railroad it will, on account of its excellence, prove a valuable acquisition to the trade.

The Evansville, Terre Haute & Chicago Railway, running from Terre Haute, Indiana, to Danville, Illinois, has been completed, ballasted and equipped, as predicted in my last report. During the month of March, 1872, they transported fourteen hundred and ten car loads of coal, and have averaged twelve hundred and eleven car loads, of twelve tons each, every month since the completion of the road. This company have arranged for an extension of their road north, from Danville to Gilman, on the Illinois Central Railroad, a distance of forty-eight miles. This extension will be built with easy grades, and laid with steel rails, with an especial view to carrying coals at the lowest possible rates from the Indiana coal field to Chicago. This route, with its connections, will be a short and direct one, and in co-operation with the Illinois Central Railroad, will have excellent facilities for the transportation of freight and passengers from the Wabash Valley to the great Northwest. Coal mines have been opened along the line of this railroad in the southern part of Vermillion county, Indiana, and at the Horse-shoe, on Little Vermillion creek, southwest of Eugene, on the line of the proposed Toledo & St. Louis Railway.

Hough & Co., at Clinton, work their mine by an adit, and elevate the coal to the dump-house by horse power. The seam ranges from four feet eight inches to five feet two inches, and will average five feet in thickness. It burns to

a white ash, without clinker, and makes a satisfactory steam and locomotive fuel.

J. W. Walker, near Clinton, has about one hundred and twenty acres of coal land. His mine is worked by an adit, and the coal elevated to the dump-house by steam power. The present product of this mine is seventy-five tons a day, with a present capacity of one hundred and eighty tons a day; average thickness of seam, five feet six inches. The whole product proves acceptable in the Chicago market for locomotive, steam and household purposes.

Aquilla Nebeker has opened the same seam, one and three quarter miles north of the above named mines, by an adit, but waggons the coal two-thirds of a mile. The seam here is five feet thick; and he is mining thirty-six tons per day. The upper part of the seam is caking coal, while the lower part is laminated, and contains from two to four inches of block coal, as noted by Professor F. H. Bradley, in his Report on Vermillion County, 1869, page 164. It is worthy of note, here, that this seam, which is referable to L in the general section of Indiana coals, is divided into two members by a parting of fire clay. While the upper part is caking, the lower part contains more or less block coal. At the Leatherman, Mill Bank and Firman mines, the entire lower member, twenty to thirty inches thick, is a true block coal, and at the Leatherman mine in particular, where it has been well opened, the walls exhibit the zigzag notches peculiar to block coal mines in Indiana.

At Clinton Locks, Fitch & Co. are putting down a switch to the old mines, once worked on an extensive scale, for shipment by canal. The seam is from five feet six inches to six feet thick. The mine will be in operation by the 1st of January, 1873. They expect to raise fifty tons per day, and have plans for the enlargement of their works this coming summer, which will greatly increase the capacity of the mine.

On the line of the Evansville, Terre Haute & Chicago Railroad, at Hillsdale, in Vermillion county, Burns, Porter & Co. have made a test of the fire clay underlying the coal



which outcrops at that place. Bricks manufactured by hand were placed in the bridge-wall of a puddling furnace along with the justly celebrated Mt. Savage fire brick, and withstood this trying test during a period of more than seven weeks, in a state of perfect preservation ; after which time they were no longer noticed, as the wall appeared to be sound. It may be well to say that the average duration of time which the best known fire brick stand in a similar situation, is nine weeks, and consequently we may fairly expect from this deposit, an article of fire brick, which will successfully compete with the best brands in the market. This clay has the rare and desirable quality of drying without cracking or warping, and with but little shrinkage. A crucial test was made in the hottest fire possible with a common furnace, to glaze or melt it, but without success, which appears to indicate that it is nearly free from alkali and other objectionable substances. These tests, with brick rudely made by hand, are deemed so satisfactory that the proprietors felt justified in beginning operations for manufacturing fire brick, etc., on a large scale. They have visited fire brick factories in the Eastern States and purchased machinery of the latest and best models to be found including a fire clay grinding mill, which has a roller that weighs four thousand pounds, and is capable of reducing a quantity of clay sufficient to make four thousand bricks per day. This mill and other machinery is driven by a twenty-four horse power engine. The company have just fairly commenced manufacturing, and hope to be able to supply a moderate demand during the coming autumn and winter. By next spring they expect to be able to meet the wants of the market.

At the same point, Montgomery & Co., formerly connected with a similar enterprise at Brazil, have erected first class buildings, which are admirably adapted to this branch of manufacture, together with a kiln that has a capacity to burn twenty-five thousand bricks. They have also purchased a set of roller-grinders for the reduction of the clay, to be

driven by steam, and expect soon to be in successful operation. Thorough tests of the clay, which proved eminently satisfactory, have also been made.

H. B. Hammond, President of the Indiana & Illinois Central Railroad, assures me that he will have the Illinois division of this road, from Decatur to Montezuma, on the Wabash river, completed and the cars running by the 1st of January, 1873, and that the Indiana division, through Parke, Hendricks and Marion counties to Indianapolis, will be speedily placed under contract, and completed some time during the coming year.

If the subsidies heretofore pledged to this road in Indiana, are made good, he expects to build it on the surveyed line; but otherwise, the most desirable and least expensive route will be selected; taking, of course, special care to cross the coal field in such a manner as will secure the best locations for coal mining operations. A direct road from the valuable coal field of Vermillion and Parke counties to Indianapolis and the important cities of Illinois, reached by the western division and its connections, must add very greatly to the commercial prosperity of the country. The enterprise has been so long on hand that faith in its completion has been almost lost; yet it is to be hoped, that with the cheering prospect now before us, one more effort will be made by the citizens along the line to have the road located where it will subserve the best interests of the counties through which it is to pass.

The Loganport, Crawfordsville & Southwestern Railway, under the management of John Lee, has been completed since the publication of the last Report, and reaches the coal along the valley of Sand creek, in Parke county. The changes wrought by this railroad through the hitherto quiet and beautiful agricultural district of Sand creek is indeed marvelous. Numerous mines have been opened and are in active operation. The village of Nyesville, four miles from Rockville and filled with a large mining population, usurps the site of a recent field of corn, and the plow has been exchanged for the miner's pick.

A branch road, one and three-quarter miles in length, reaches the Sand Creek Company's mines. Two seams, K and I, are workable on the property of this company, which comprises an area of six hundred acres. These two seams are separated by fifteen to twenty feet of shale and sandstone. The lower seam, 3 ft. 9 in. thick, is good block coal. The upper seam, K, four and a half feet thick, is an excellent quality of caking coal, and is the principal seam mined at this time, as it can be worked by adits at a convenient height above the railroad track to give room for "dump-houses," where the coal is screened and delivered into the cars. The following section exhibits the position of the seams of coal at these mines:

SECTION AT SAND CREEK COAL MINES.				
SPACE.		FT.	IN.	
		8		Soil and Clay.
		26		Drift.
		30		Sandy Shale, with some Flags.
73.6		9	6	Limestone. Bituminous Shale.
4.6		4	6	COAL K.
		3		Fire Clay.
18.0		15		Bluish argillaceous Shale.
3.9		3	9	COAL I.
		1		Fire Clay.
11.0		10		Shale and Sandstone.
		110	11	Sand Cr.

This company commenced operations last winter and have now two mines with separate "Head works" arranged in the most approved manner for economizing labor in screening, loading and weighing. The entries and rooms in the mine first opened are now sufficiently extended to permit them to

take out two hundred and forty tons of coal a day, but the delivery, at the time of my visit, only reached one hundred and forty-four tons, on account of a scarcity of miners. The new mine will soon be ready for delivering coal. The demand for this coal for locomotive and general uses is far in advance of the supply, and it has a high reputation in the market. It is a bituminous coal that may be classed as semi-caking from the fact that it agglutinates in burning less than the fatty caking coal of seam L. The color varies from dull black to glossy jet, and the fracture, from cubical to conchoidal, according to the part of the seam from which the specimen is taken.

A proximate analysis of an average specimen from the new mine shows it to be remarkably rich in hydro-carbon.

#### SAND CREEK COAL.

Specific gravity, 1.296; a cubic foot weighs 81.00 lbs.

Coke,	-	-	50.00	{	Ash, light brown,	-	4.50
				{	Fixed Carbon,	-	45.50
Volatile matter,			50.00	{	Hygroscopic Water,	-	4.50
				{	Gas,	-	45.50
<hr/>				<hr/>			
100.00				100.00			

Products obtained by ultimate analysis from 100 parts of coal:

Carbon,	-	-	-	-	-	-	-	76.38
Ash,	-	-	-	-	-	-	-	4.71
Hydrogen,	-	-	-	-	-	-	-	4.71
Oxygen,	-	-	-	-	-	-	-	12.32
Nitrogen,	-	-	-	-	-	-	-	1.88
<hr/>								100.00

Taking 8080 as the heat unit for the combustion of one part of pure carbon to carbonic acid; and 34,462 as the heat unit for the combustion of one part of hydrogen, which is according to the very accurate determinations of Faver and Silberman, we are enabled, by the aid of the above analysis

of the Sand Creek coal, to calculate its calorific power as compared with the combustion of an equal weight of carbon. These heat units refer to no particular weight, but simply indicate that a grain, or a pound, or a ton will raise the temperature of as many grains, pounds or tons of water from 4° to 5° of Centigrade.

And since the calorific power of hydrogen (34,462) is to the calorific power of carbon (8080), as 1 to 4.265, we have merely to multiply the percentage of available hydrogen by 4.265 and add the product to the percentage of carbon in order to determine its relative calorific power. The total amount of hydrogen found in the coal from the Sand Creek Company's new mine is 4.71 per cent.; of this amount 1.54 per cent. is required to saturate the oxygen (12.32 per cent.), giving 13.86 per cent. of combined water. We have then 3.17 per cent. of available hydrogen, which, multiplied by 4.265, gives 8990 as its relative calorific power compared to the combustion of pure carbon to carbonic acid. The heat unit is found by multiplying the carbon of the fuel by 8080 and the available hydrogen by 34,462. For example: In 100 parts of the sample of coal analyzed from the Sand Creek Company's new mine there are .7638 parts of carbon and .0317 parts of available hydrogen, then  $.7638 \text{ C.} \times 8080 + .0317 \text{ H.} \times 34,462 = 7208$  heat units of the coal.

By dividing the heat units (7208) by 100 (the number of degrees, Centigrade, between the freezing and boiling points), we will have 72.08 as the number of pounds of water one pound of the coal will raise from the freezing to the boiling point; and since it requires 5.5 times more heat to convert water into steam than to raise its temperature from 0° to 100° Centigrade, we will find by dividing 72.08 by 5.5 that it will convert 13.10 pounds of water into steam.

Mr. I. Lowthian Bell\* considers 11,000 to be the heat unit of the volatile hydrocarbons given off in the combustion of coal. This number I find to be as nearly correct as possible when tested in calculating the calorific power of the Sand

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\*Chemical phenomena of iron smelting, page 306.

creek from the proximate analysis given above; provided the combined water, 13.86 per cent., is deducted from the total amount of volatile matter as well as the hygroscopic water determined by proximate analysis.

The percentage of solid carbon is .455, which, multiplied by 8080, gives 3676.4 heat units. The total volatile matter is .500, from this must be deducted .045 of hygroscopic water and .138 of combined water, which will leave .317 of hydrocarbons, this multiplied by 11,000 gives 3487 hydrocarbon calories.

The .3487 heat units of hydrocarbon added to the 3676 heat units of the solid carbon, gives 7163 as the heat units of the coal.

The ultimate analysis of an average specimen of coal taken from the old mine belonging to the Sand Creek Coal Company indicates for this coal a still higher calorific power; the elementary constituents in 100 parts are:

Ash, white,	-	-	-	-	-	-	3.19
Carbon,	-	-	-	-	-	-	77.03
Hydrogen,	-	-	-	-	-	-	5.60
Oxygen,	-	-	-	-	-	-	12.64
Nitrogen,	-	-	-	-	-	-	1.54
							<hr/>
							100.00

It gave less ash and a larger percentage of carbon and hydrogen.

Calculated as before:

Carbon,	-	-	-	.7703	×	8080	=	6224
Available hydrogen,	-	-	-	.0402	×	34462	=	1385

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Gives heat units=7609

A pound of coal will raise 76.09 pounds of water from the freezing to the boiling point.

The proximate analysis of this coal was not made, consequently no comparison can be given of the two modes of calculation.

At the end of this Report a table will be found showing the calorific power of all the coals which the time allotted to chemical work has enabled us to make.

The Sand creek coal has a deservedly high reputation for steam and household use, and commands in the Chicago and Indianapolis markets as good a price as the block coal.

The other mines on Sand creek which are working this seam are: Parke Coal Company, Campbell's mine, and Kyle's mine.

Coal K is found over a large area of Parke county; it is the coal mined by Beard on section 25, town 15, range 6 and by Nevin on section 31, town 15, range 6 in the south part of the county.

The proximate analysis of Beard's coal, given below, shows it to be fully equal to the Sand Creek coal:

#### BEARD'S COAL.

Specific gravity, 1.191; one cubic foot weighs 74.43.

Coke,       -       -       49.50	{	Ash, white,       -       -       -       1.00
		Fixed carbon,       -       -       -       48.50
Volatile matter,    50.50	{	Water,       -       -       -       -       8.00
		Gas,       -       -       -       -       42.50

Coke lamellar, brilliant, not swollen.

The details of the geology of this county will be found in the able report of Prof. Barnabas C. Hobbs.

The Indianapolis & St. Louis Railroad Company have surveyed a route for a branch road, which leaves the main line a short distance east of Carbon, in Clay county, and passing half a mile north of that town, continues westward and returns to the main track at Lodi, about eight miles from the starting point.

A shaft has been sunk and quite a number of mining enterprises have already been started along this proposed road which traverses a good district for coal.

The enterprising managers of the St. Louis, Vandalia, Terre Haute & Indianapolis Railroad are pushing their branches still farther south, and some of the heaviest mining

operations in the county are now carried on in this part of the block coal field. This road, with its fine equipment of cars and numerous branches that traverse the block coal field, is hauling nearly all the coal that is at present mined in this county for market.

A portion of the western division of the proposed railroad from Cincinnati to Terre Haute has been finished, and trains are running from Terre Haute to Middlebury, in Clay county. Mines have been commenced along the road to work the seams of caking coal over which it passes. The present terminus does not reach quite far enough east to strike the zone of block coal.

An organization has been recently formed, which comprises some of the leading business men of Indianapolis, to build a railroad to the block coal field in the southeastern part of Clay and western part of Owen counties, to be known as the Indianapolis Block Coal & Western Railway. The termini are Indianapolis and a point at or near Merom, on the Wabash river, in Sullivan county, Indiana.

If this road is built, it will afford facilities for extensive mining and manufacturing operations along the line, and prove of incalculable benefit to the country through which it passes, as well as to the city of Indianapolis.

A number of railroads are projected to run across the coal field in the southern part of the State.

The New Albany & St. Louis Air Line Railway has a portion of the track completed and the cars running over it.

I am also informed that the greater part of the road-bed in this State is finished ready for the iron, and that through the untiring energy of the President, Mr. Bradley, and the Secretary, Mr. Lyman, work is pushed forward with great rapidity all along the line.

Coal mines are already opened, and their numbers will rapidly increase along the road when it is completed to the great coal markets that it is designed to reach.

The Cincinnati & Rockport Railroad, which is to run from Rockport, on the Ohio river, in Spencer county, to Mitchell, in Lawrence county, Ind., and from thence, by connections



with the Ohio & Mississippi Railroad, to Cincinnati, Ohio, is being built. The greater part of the grading has been finished in Spencer county, and it is expected that the road-bed will soon be ready for the iron as far north as Jasper, in Dubois county.

This road runs through the block coal field in the north part of Spencer and in Dubois counties, and will open up facilities for the establishment of blast furnaces in this part of the measures, as iron ores may be brought to Rockport by boats on the Ohio river.

A branch of the Cincinnati & Rockport Railroad is projected to run from Mitchell across the coal fields in Dubois, Pike, Gibson and Posey counties, and terminate at Mt. Vernon on the Ohio river, in the latter county.

The Evansville & Sandusky Railroad is projected to run from Evansville, in Vanderburg county, through the coal field in Warrick county, and a portion of Spencer and Dubois counties; thence to Seymour, at the crossing of the Jeffersonville, Madison & Indianapolis Railroad and the Ohio & Mississippi Railroad. The road-bed, I am informed, has been completed on this line from Evansville to Booneville, in Warrick county, and there is reason to believe that the road will be speedily finished to Seymour. It connects Evansville with the block coal field by the most direct route, and will insure to her flourishing manufacturers a supply of excellent fuel.

Evansville is favorably situated for obtaining iron ore by water transportation, at very low rates, from Missouri and the large deposits in the region bordering the Cumberland river in Kentucky. This, together with the ready access which the above road will secure to the block coal, gives them facilities for manufacturing iron that are not surpassed by any location in the State. The large rail rolling mill which is being built this year will prove but the beginning of her success in that direction, and open the road for the erection of blast furnaces.

The Indiana Mineral Railway is projected to run from a point on the Ohio river at or near the mouth of Anderson

creek, northward through Jasper, in Dubois county, to Black Oak Station, on the Ohio & Mississippi Railroad, in Daviess county, thence continuing north to Bloomfield, in Greene county, where it will connect with the proposed Indiana North & South Railway.

Mr. John Alexander, of Philadelphia, the President of this road, is making every possible exertion to have it built.

It is the intention of the officers of this road to locate it near the center of the block coal zone, with a view of making the coal available for iron manufactures that are to be established at the terminus on the Ohio river. I am not aware that any grading has yet been done on this road.

Before dismissing the subject of railroads, which so materially aid in the development of the country, it may be well in this connection to make a few remarks in reference to the Wabash & Erie Canal. The lower part of this canal, from Montezuma, in Parke county, to Evansville, on the Ohio river, which is now without water and abandoned, runs through the very heart of the coal measures as well as one of the finest agricultural districts in the State. There is also in places along this portion of the canal large quantities of excellent timber.

If, in view of these facts, the owners of the canal would go to work and put it into good order it would eventually be one of the best investments in the State. When first made, the country through which it passed was for a great part of the distance almost a wilderness with but little commerce. It now teems with an agricultural, manufacturing and mining population that will furnish all the commerce that can be desired. Blast furnaces will be erected along its banks and the supply of ores to feed their rapacious stomachs can be brought by water transit from the large deposits of Missouri and the Cumberland river districts; as also the Lake Superior ores by its northern division. The valuable coal which may be mined along its banks and loaded direct from the shafts into boats will find its way to ready markets both north and south. Indeed, there is not a more favorable location to be found for a canal, and why the very part

which is sure to be remunerative has been abandoned and let go to ruin is difficult to understand. The fact of railroads running by its side for a part of the way is not a good and sufficient excuse for its abandonment. There is now, and will be, business enough for all, and the policy which has been pursued must be placed to the account of bad management and want of foresight on the part of the directors.

Since the publication of my Report on Daviess county, the Buckeye Cannel Coal Company have sunk a shaft at Black Oak Station, on the Ohio & Mississippi Railroad, which, at a depth of eighty feet, reached a seam of coal I, four feet six inches thick. The upper part of this seam, two feet six inches, is a hard, compact cannel coal, and the lower part of the same, two feet, is a rich caking coal. The two qualities of coal are not separated, as is usual, by shale or fire clay, but are so firmly united that fragments of the under part are often found attached to the cannel coal.

The following is a section of the strata passed through by their shaft :

BLACK OAK STATION.				
SPACE.		FT.	IN.	
39.		18		Soil and Clay.
		15		Quick Sand.*
		6		Gray Shale.
3.		3		BLOCK COAL K.
16.		5		Hard Fire Clay.
		4		Sandstone.
		7		Gray Shales.
1.4		1	4	BLOCK COAL.
15.		1		Fire Clay.
		4		Sandstone.
		10		Black Slate.
4.6		4	6	COAL I. { CANNEL, 2 ft. 6 in. CAKING, 2 ft. 0 in.
2.		2		Fire Clay.
TOTAL.		80	10	

\*A stream of water was encountered in this sand, which gave them great trouble, and materially increased the cost of sinking the shaft. The flow of water was estimated at 1,000 barrels in 24 hours.

The Buckeye Cannel Coal Company have their mine in full operation and the coal meets with general favor. While the lower part brings the usual price of caking coal, the upper part, which is cancell, commands two to three cents

more per bushel and has a ready sale. The top seam of coal K, of this shaft is block, but here the roof is not strong enough to admit of its being worked, though on an adjoining property it has a good roof and is worked by an adit.

An exhaustive chemical analysis has been made of both the cannel and caking coal mined by the Buckeye Cannel Coal Company and the results are here given:

Cannel coal, proximate analysis:

Specific gravity, 1.229; one cubic foot weighs 76.87 lbs.

Coke,	-	-	48.00	{	Ash, white,	-	-	6.00
				{	Fixed carbon,	-	-	42.00
Volatile matter,			52.00	{	Hygroscopic Water,	-	-	3.50
				{	Gas,	-	-	48.50

Coke laminated, not swollen, lustreless.

Ultimate analysis of the same:

Carbon,	-	-	-	-	-	-	-	71.10
Ash	-	-	-	-	-	-	-	7.65
Hydrogen,	-	-	-	-	-	-	-	6.06
Nitrogen,	-	-	-	-	-	-	-	1.45
Oxygen,	-	-	-	-	-	-	-	12.74
Sulphur,	-	-	-	-	-	-	-	1.00
								<hr/>
								100.00

The relative calorific power is 9029; carbon being 8080, thus:

Available hydrogen,	-	.045	$\times 4.265 = 1919$
Carbon,	-	.7110	$+ 1919 = 9029$

The heat units of the coal are 7294, thus:

.7110 carbon  $\times$  8080 heat units = 5744 carbon heat units.

.045 available hydrogen  $\times$  34462 = 1550 hydrogen heat units.

1550 hydrogen heat units + 5744 carbon heat units = 7294 coal heat units.

Expressed in a manner that will be more generally understood, it may be stated that the calculated or theoretical calorific power of this coal indicates that one pound of coal will raise the temperature of 72.94 pounds of water from the

freezing to the boiling point, or one pound of coal will convert into vapor 13.26 pounds of boiling water.

The heat units calculated from the proximate analyses are in this instance somewhat greater than is shown by the ultimate analyses, which may, in part, be owing to the fact that the analyses were made from different specimens, and that while one shows only six per cent. of ash, the sample taken for ultimate analysis gave 7.65 per cent.

Tested for gas, one pound of this cannel coal gave 4.86 cubic feet which had an illuminating power equal to 25.2 sperm candles. In practice the yield will be much greater.

For the purpose of comparison, a sample of Youghioghenny coal obtained from the Indianapolis Gas Works, and here considered the best gas coal to be had in the Pennsylvania field, was tested in the same manner, and the yield of illuminating gas was 4.05 cubic feet to the pound of coal, with an illuminating power of seventeen candles. In practice, at the Gas Works, the Youghioghenny coal yields 4.34 cubic feet per pound. The difference between the laboratory result, 4.5 cubic feet, and the practical yield of gas in the gas works, 4.34 cubic feet, furnishes a data by which to calculate the quantity of gas which may be obtained from the Daviess county cannel coal by distillation under similar conditions.

The ratio of the two quantities is as 1. to 1.07; therefore we have merely to multiply the number of cubic feet, 4.68, obtained in the laboratory, by 1.07 to find the number of cubic feet which the cannel coal will yield at the gas works, thus:

$$4.68 \times 1.07 = 5.2 \text{ cubic feet.}$$

In practice then the cannel coal will furnish 5.2 cubic feet of gas to the pound of coal, or 10400 cubic feet to the ton of 2000 pounds, and the Pittsburg coal 4.34 cubic feet to the pound, or 8680 cubic feet to the ton. The ratio of the two quantities is as 1 to 1.2.

It is not only the increased quantity of gas which the cannel coal yields that recommends it to the favorable con-

sideration of the gas companies, but it likewise gives a gas of very high illuminating power.

The illuminating power of a gas is ascertained by comparing the light which it will give in burning five cubic feet per hour in a standard argand burner, with the light given by a standard sperm candle, six to the pound and burning one hundred and twenty grains of sperm per hour. Tested in this manner the gas from Pittsburg coal has an illuminating power of seventeen standard sperm candles, and that from the Daviess county cannel coal 25.2 candles or as 1 to 1.5.

The value of gas in grains of sperm consumed is found by multiplying the candle power by 120, the number of grains of sperm consumed, and dividing the product by five, the number of feet of gas burned.

$$\frac{25.2 \times 120}{5} = 605.$$

The value, then, of one cubic foot of gas from the cannel coal is equal to the value of 605 grains of sperm.

Calculated for the Pittsburg coal we have:

$$\frac{17 \times 120}{5} = 408 \text{ grains.}$$

One cubic foot of this gas is equal in value to 408 grains of sperm. The relative value of the two gases in sperm, the Pittsburgh taken as one, is 1 to 1.5.

To offset the deficiency in quantity and illuminating power of the gas from the Pittsburg coal as compared with that from the Daviess county cannel coal, we must bear in mind that while the coke from the former coal is abundant and of excellent quality, and the large surplus over what is required for heating the retorts finds a ready sale in the market as a fuel, the coke from the cannel coal is small in quantity and comparatively inefficient for fuel.

The comparisons given below of the relative values of the two cokes are made from the laboratory experiments;

as the results obtained at the gas works are variable from the fact that coke gains from twenty to twenty-five per cent. in weight by being wet.

One hundred parts of Pittsburg coal distilled for gas, gave:

Coke,	-	-	70	} = 67 per cent. of solid carbon.
Ash,	-	-	3	

One hundred parts of cannel coal gave:

Coke,	-	-	52.8	} = 39.3 per cent. of solid carbon.
Ash,	-	-	13.5	

Rating Pittsburg coal as 1, the value of the respective cokes is as 1. to 0.587. We may consider, therefore, that the coke from the former is worth twice as much as that from the latter, for heating purposes.

A table will be given, further along, showing the relative value of all the coals which have been tested for gas, but I desire, in this place, to make special note of the analyses which have been made to determine the value of the coal from seam L for gas purposes.

The coal from Washington, in Daviess county, has not been tested in the laboratory; but a practical test was made at the Indianapolis Gas Works, and the yield was 4.16 cubic feet per pound. Being absent from the city at the time this test was made, I had no opportunity of determining its illuminating power; but Mr. Stacy, the intelligent and obliging superintendent of the works, to whom I am indebted for a multitude of favors,\* informs me that it was

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\*The Indianapolis Gas Light & Coke Company, having remodeled and greatly enlarged their buildings, have now the most complete gas works in the West. Everything is being made new, and no expense has been spared to procure machinery and apparatus of the most approved character. They are also putting up and have nearly completed a miniature gas works for testing coals for gas. Twenty pounds, or the one hundredth part of a ton, is the capacity of the retort, and this quantity will be ample to enable them to determine the amount and illuminating power of the gas, and, in fact, the value of all the constituents of the coal. Such an apparatus should be purchased by the State for the use of the survey, as I do not feel at liberty to trespass upon the uniform courtesy which the Gas Company and their agents have always shown to me when seeking information which, in some instances, it might not be prudent to give if governed by pecuniary interests.



nearly equal to the Pittsburg, and the yield of coke was very fair as to quantity and quality.

In the Pioneer shaft at Curryville in Sullivan county, Indiana, which is owned by Smith, Beswick & Co., there are two seams of caking coal, L and K, as given in the section of this shaft by Prof. John Collett.\*

The space between the two is forty-seven feet. The upper seam, L, is 4 ft. 6 in. thick and the lower seam, K, is 5 ft. 2 in. thick.

Tested for illuminating gas, this lower seam gave, calculated for one pound of coal, first trial:

Gas,	-	-	-	-	-	3.68	cubic feet
Coke,	-	-	-	-	-	.575	pounds.
Carbonic acid and Sulphur,	-					.015	"
Water,	-	-	-	-	-	.025	"
Tar and ammoniacal liquor,	-					.070	"

Second trial of same coal gave:

Gas,	-	-	-	-	-	3.61	cubic feet.
Coke,	-	-	-	-	-	.625	lbs.
Tar and ammoniacal liquor,	-					.075	lbs.
Water,	-	-	-	-	-	.025	"
Carbonic acid and Sulphur,	-					.010	"

The average yield of gas by the above analysis is 3.65 cubic feet per pound of coal, which, multiplied by 1.07, the ratio between the laboratory yield and the quantity obtained by distillation at the gas-works gives:

$$3.65 \times 1.07 = 3.90.$$

The gas value of this coal may then be fairly stated at 3.90 cubic feet to the pound. Mr. Stacy, Superintendent of the Indianapolis Gas-works, made a trial of the same coal from Sullivan county, probably from this seam, and he thought the yield of gas was about four cubic feet to the pound of coal.

The illuminating power is equal to fifteen candles, which

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\*See Geological Rep. 1870, pp. 212-213.

is two less than that of the Youghioghenny coal. The average yield of coke is sixty-five per cent. Ash in the coke 4.46 per cent., leaving 60.54 per cent. of solid carbon.

The value of the Standard shaft coal, for gas, compared with the Youghioghenny, is:

Youghioghenny,	-	-	-	-	100	} Ratio of quantity.
Standard,	-	-	-	-	90	

As compared for illuminating power:

Youghioghenny,	-	-	-	-	100	} Ratio of quality.
Standard,	-	-	-	-	88	

Value of coke:

Youghioghenny,	-	-	-	-	-	-	100
Standard,	-	-	-	-	-	-	90

An exhaustive analysis has been made of another coal from Sullivan county, belonging to Henry K. Wilson:

Specific gravity, 1.228; weight of one cubic foot, 76.75 lbs.

Coke,	-	-	52.40	{ Ash, white,				-	-	-	.80
				{ Solid carbon,				-	-	-	51.60
Volatile Matter,	-	-	47.60	{ Water,				-	-	-	2.35
				{ Gas,				-	-	-	45.25

Coke puffed, brilliant and porous.

Ultimate Analysis : \*

Ash, red,	-	-	-	-	-	-	1.66
Carbon,	-	-	-	-	-	-	4.09
Nitrogen,	-	-	-	-	-	-	1.80
Oxygen,	-	-	-	-	-	-	11.45
Sulphur,	-	-	-	-	-	-	1.00
							<hr/> 100.00

Calculated for calorific power:

Carbon  $.8409 \times 8080 = 6794.4$  carbon heat units.

Available hydrogen }  $.0351 \times 34462 = 1209.6$  hydrogen heat units.

$6794.4 + 1209.6 = 8004.$  total heat units.

The calorific power is 8004 heat units.

\*Made from another specimen of the coal.

One pound of coal will raise 80 pounds of water from the freezing to the boiling point, or convert 14.54 pounds of boiling water into vapour.

The calorific power calculated from the results obtained by the proximate analysis is a little less:

Solid carbon  $.516 \times 8080 = 4169$  carbon heat units.

Hydrocarbons after deducting hygroscopic and combined water.  $\left. \vphantom{\begin{array}{l} \text{Hydrocarbons after} \\ \text{ducting hygroscopic and} \\ \text{combined water.} \end{array}} \right\} 3237 \times 11000 = 3560$  heat units.

$4169 + 3560 = 7729$  total heat units.

Tested by either mode of calculation the calorific power of this coal is very high.

Distilled for gas, one pound of coal gave:

Pure illuminating gas,	-	-	3.95	cubic feet.
Coke,	-	-	.675	pounds.
Ash,	-	-	.012	"
Ammoniacal liquor,	-	-	.05	"
Candle power,	-	-	15.	

Comparative yield of gas:

Youghiogeny,	-	-	-	-	100.
Wilson,	-	-	-	-	98.

Illuminating power:

Youghiogeny,	-	-	-	-	100.
Wilson,	-	-	-	-	88.

Value of coke:

Youghiogeny,	-	-	-	-	100.
Wilson,	-	-	-	-	97.

It will be apparent from the above that the Wilson coal, for gas, approaches very closely to the best Youghiogeny gas coal.

In order that our Western coals may be more fully appreciated and their true value for gas understood by the gas companies, I will give a few examples in the way of drawing a comparison between the value of the English,

the Indiana and the Youghioghenny gas coals, estimating the latter at 100.

The English coal here cited is the average of forty-eight samples of caking coals used at various gas works.

	YOUGHIOGHENY.	ENGLISH.	WILSON'S INDIANA.
Yield of gas, - - -	100	106	98
Illuminating power, -	100	74	88
Value of coke, - -	100	95	97

Specimens of peat from St. Joseph county, Indiana, cut from the bog in cubes, pressed and thoroughly air dried, were obtained from Rev. W. Corby, of Notre Dame College, where it is largely used as fuel, have also been tested to determine its commercial value as fuel, compared with wood; and for gas, compared with Youghioghenny coal.

The proximate analysis gave:

Coke, - - 36.00	{ Ash, dirty yellow, -	9.50
	{ Solid carbon, - -	26.50
Volatile Matter, 64.00	{ Water, - - -	8.50
	{ Gas, - - -	55.50

Calculated for calorific power:

Solid carbon  $2650 \times 8080 = 2141$  carbon heat units.

Hydrocarbon  $5550 - \text{combined water } 3646 = \text{hydrocarbon } 1905 \times 11000 = 2095$  heat units.

$2141 + 2095 = 4236$  total heat units for the peat. This, in calorific effect, will raise 42.36 pounds of water from the freezing to the boiling point, or convert 7.7 pounds of boiling water into vapor.

Air dried beech wood, as used for fuel, contains in 100 parts\* :

Carbon, - - - - -	39.10
Hydrogen, - - - - -	4.90
Oxygen, - - - - -	36.00
Water and Ash, - - - - -	20.00

\*See Wagner's Chemical Technology, page 704.

Calculated for calorific power :

Carbon, -  $.3910 \times 8080 = 3159$  carbon heat units.

Available hydrogen,  $.004 \times 11000 = 44$  hydrogen heat units.

$3159 + 44 = 3203$  total heat units.

This will raise 32.03 pounds of water from the freezing to the boiling point and convert 5.8 pounds of boiling water into vapor.

The relative evaporating value of the St. Joseph county peat, well dried, and air-dried beech wood may be stated thus :

100 pounds beech wood will evaporate 5.8 pounds water.

100 pounds peat will evaporate 7.7 pounds water.

Ratio of value :

Wood, - - - - - 100.

Peat, - - - - - 133.

That is, the peat has, theoretically, about one-third more evaporating power than the wood.

An example of peat given by Wagner\* has 4033 heat units. The evaporative power is 7.3 pounds of water, which is nearly the same as obtained from the St. Joseph peat.

A numbers of examples from the same authority—Wagner—are here given for the sake of comparison. They are according to Brix's investigations.

			WATER. Per cent.	UNDRIED. Per cent.	DRIED. Per cent.
Fir wood,	-	-	16.1	4.13	5.11
Elm,	-	-	14.7	3.84	4.67
Birch,	-	-	12.3	3.72	4.39
Oak,	-	-	18.7	3.54	4.60
Red beech,	-	-	22.2	3.39	4.63
White beech,	-	-	12.5	3.62	4.28

That is to say, one pound of fir wood, containing 16.1 per cent. of water will evaporate 4.13 pounds of water.

The evaporating power of wood is only half that of caking coal, and according to the above results, it is also less effective than the Notre Dame compressed peat.

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\*Wagner's Chemical Technology, page 701.

Peat is the carbonaceous product resulting from the decomposition of plants which grow in shallow stagnant water. The plants from which it is chiefly derived belong to the family of mosses. The most abundant peat-forming plant is the sphagnum, which sends out new shoots and continues to grow at the surface of the water, while the older parts are undergoing the transformation into peat.

The cost of cutting and preparing peat for market, in this country where labor commands such high wages, is very great; but when the better kinds are properly pressed and dried, it makes a very desirable fuel, and the time is not far distant when it will be brought into more general use in the northern part of the State, where there is no stone coal, and wood is becoming scarce.

The results obtained, and given above, for the calorific power of fuel, are based upon the complete conversion of its combustible constituents into carbonic acid and water. As this, however, is seldom, if ever, accomplished in practice, and there is besides, a very great loss by radiation and from the formation of soot, cinder, etc., the calorific power obtained from fuel, in its practical application, is seldom more, and in many instances very much less than one-half of its theoretical value. The heat generated by the combustion of carbon to carbonic acid is 8080, while the heat generated by the combustion of twice the weight of carbon to carbonic oxide is 4046, showing a loss of 3134 heat units.\*

The value of fuel depends very much on the amount of volatilizable substances which it contains, and coals which have a large amount of hydro-carbons burn with a large flame, and are considered the best for generating steam, while the less gaseous coals are preferred for iron smelting.

The examples given by I. Lowthian Bell,† to show the relative value of coke and raw coal for smelting iron in blast-furnaces, are defective. The estimate for the heat units for the volatile matter of the coal, is too great. A deduc-

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\*Watt's Dictionary of Chemistry, Fuel.

†Chemical Phenomena of the Blast Furnace, pp. 305, 306.

tion of at least four-tenths should be made for the hygroscopic and combined water of the coal.

On the other hand, either the raw coal, of the Scotch' furnaces cited, was of a character unsuited for the business, or the furnaces and the blast were not arranged to secure a favorable combustion of the coal.

A much better result is obtained from the use of raw block-coal in Clay county, where only 4250 pounds of coal are required to make a ton of iron, and I am fully of the opinion that with properly constructed furnaces this quantity may be materially reduced.

The elementary analyses of five block-coals, used for smelting iron, are here subjoined:

	Ash.	Carbon.	Hydrogen.	Nitrogen.	Oxygen	Sulphur.
Garlick & Collins' Brazil Fur'ce, No. 1	3.88	76.81	4.13	1.78	12.90	.50
"      "      No. 2	1.07	82.70	4.77	1.62	9.89	.45
Star Mine, Planet Furnace, No. 1.....	2.74	80.74	5.61	1.67	8.60	.72
"      "      No. 2.....	2.74	81.60	4.39	1.67	8.87	.72
Clay Coal Company's Mine.....	1.68	84.68	4.10	1.35	7.69	.50

The average of the two specimens analyzed from Garlick & Collin's mine will give:

Carbon,  $.7975 \times 8080 = 6444$  carbon heat units.

Hydrogen,  $.0306 \times 34462 = 1054$  hydrogen heat units.

$6444 + 1054 = 6498$  total coal heat units.

The average of the two specimens analyzed from the Star Mine will give:

Carbon,  $.8120 \times 8080 = 6560$  carbon heat units.

Hydrogen,  $.05 \times 34462 = 1723$  hydrogen heat units.

$6560 + 1723 = 8283$  total coal heat units.

The practical evaporative effect of a coal may be taken as equal to two-thirds of that which has been calculated from its chemical composition.

The following coals collected by Prof. John Collett, from Dubois and Pike counties, have been proximately analyzed and the results are given below, for an account of these coal seams the reader is referred to Prof. Collett's report in this volume :

Northeast part of Dubois county, on Davidson creek, near Ludlow, is Burnham's coal A, one foot thick ; color, bright ; fracture, conchoidal and splintery ; composition in 100 parts :

#### BURNHAM'S COAL A.

Specific gravity, 1.306 ; one cubic foot will weigh 81.62 pounds.

Coke,	-	-	56.50	{	Ash, white,	-	-	3.50
				{	Fixed carbon,	-	-	53.50
Volatile matter,			43.50	{	Water,	-	-	4.50
				{	Gas,	-	-	39.00
			<u>100.00</u>					<u>100.00</u>

Coke lamellar, brilliant, not puffed.

#### ELKIN'S COAL A.

Section 21, township 1 north, range 3 ; seam 11 inches thick. Same seam as Burnham's, in the same vicinity, and is similar in appearance.

Specific gravity, 1.295 ; one cubic foot will weigh 80.93 pounds.

Coke,	-	-	54.50	{	Ash, brown,	-	-	4.00
				{	Fixed carbon,	-	-	50.50
Volatile matter,			45.50	{	Water,	-	-	6.50
				{	Gas,	-	-	39.00
			<u>100.00</u>					<u>100.00</u>

Coke laminar, dull, not puffed.

#### HARBISON'S COAL A,

Is situated on the bank of White river, in section 26, township 1 north, range 5, about three miles east of Portersville ;



the seam is 18 inches thick, the upper four inches of which is cannel, and the lower part semi-block. The analysis given below is of the cannel part of the seam :

Specific gravity, 1.198 ; one cubic foot will weigh 74.87 pounds.

Coke, - -	33.50	{	Ash, pink, - -	10.00
		{	Fixed carbon, - -	23.50
Volatile matter, -	66.50	{	Water, - - -	6.00
		{	Gas, - - - -	60.50
	<hr/>			<hr/>
	100.00			100.00

Coke unchanged in shape, lustreless, compact.

This coal is remarkably rich in gas, showing almost as much as is contained in the celebrated Boghead coal of Scotland, and although only four inches thick when seen at the outcrop, may become of great value for gas works, as small quantities can be used to enrich the gas of poorer coals. The proposed Indiana Mineral Railway is to run near this property.

#### HAY'S COAL A.

Near Bretzville, on the line of the New Albany and St. Louis Air Line Railway, on section 33, township 2 south, range 3 ; the seam is three feet thick, a compact, splinty cannel, color brilliant black, fracture conchoidal and splinty, It is mined in large cubical blocks. This seam is not of uniform quality, consequently analyses have been made of portions of the top, middle and bottom of the seam.

Upper part, slaty cannel, three inches thick.

Specific gravity, 1.289 ; one cubic foot will weigh 80.56 pounds.

Coke, - -	55.00	{	Ash, white, - -	3.50
		{	Fixed carbon, - -	51.50
Volatile matter, -	45.00	{	Water, - - -	4.50
		{	Gas, - - - -	40.50
	<hr/>			<hr/>
	100.00			100.00

Coke much puffed, amorphous, vitreous.

Middle part, bright, slaty cannel, 2 ft. 4 in. thick. Specific gravity, 1.264; one cubic foot will weigh 79. lbs.

Coke,	-	-	52.50	{	Ash, white,	-	-	3.00
				{	Fixed carbon,	-	-	49.50
Volatile matter,			47.50	{	Water,	-	-	7.00
				{	Gas,	-	-	40.50
<hr/>								
100.00				<hr/>				
				100.00				

Coke, puffed, vitreous, lamellar.

Bottom part, laminated block coal, eight inches thick. Specific gravity, 1.271; one cubic foot will weigh 79.43 lbs.

Coke,	-	-	53.50	{	Ash, white,	-	-	2.00
				{	Fixed carbon,	-	-	51.50
Volatile matter,			46.50	{	Water,	-	-	6.50
				{	Gas,	-	-	40.00
<hr/>								
100.00				<hr/>				
				100.00				

Coke slightly puffed, vitreous, laminate.

This coal is well adapted for general use, and may be used in the manufacture of iron.

#### KESLER'S COAL A.

Near St. Anthony, section 34, township 2 south, range 4, on the New Albany & St. Louis Air Line Railway, 3 ft. 6 in. to 4 ft. thick where opened. The general character of the seam at this place is a semi-block; analyses were made from the upper, middle, and lower parts of the seam.

Upper part, slaty coal, 3 inches. Specific gravity, 1.333; one cubic foot will weigh 83.31 lbs.

Coke,	-	-	51.50	{	Ash, blue,	-	-	11.50
				{	Fixed carbon,	-	-	40.00
Volatile matter,			48.50	{	Water,	-	-	7.00
				{	Gas,	-	-	41.50
<hr/>								
100.00				<hr/>				
				100.00				

Coke puffed, amorphous, vitreous.



Specific gravity, 1.305 ; one cubic foot will weigh 81.56 pounds.

Coke, - - 53.50	{	Ash, fawn, - - -	5.50
		Fixed carbon, - - -	48.00
Volatile matter, 46.50	{	Water, - - -	5.50
		Gas, - - -	41.00
<hr/>			
100.00			<hr/> 100.00

Coke much puffed, vitreous, amorphous.

This coal is near the line of the Rockport and Cincinnati Railway.

#### H. B. KATHMAN'S COAL A.

Two miles southeast of Ferdinand, on section 3, township 4 south, range 4, in the edge of Spencer county ; one foot ten inches thick ; worked by stripping ; caking coal.

Upper part, laminate semi-block.

Specific gravity, 1.250 ; one cubic foot weighs 78.12 lbs.

Coke, - - 47.50	{	Ash, white, - - -	2.00
		Fixed carbon, - - -	45.50
Volatile matter, 52.50	{	Water, - - -	4.00
		Gas, - - -	48.50
<hr/>			
100.00			<hr/> 100.00

Coke slightly swollen, lustreless, laminate.

Lower part, cubical caking coal.

Specific gravity, 1.251 ; one cubic foot weighs 78.19 lbs.

Coke, - - 50.00	{	Ash, white, - - -	2.50
		Fixed carbon, - - -	47.50
Volatile mater, 50.00	{	Water, - - -	5.00
		Gas, - - -	45.00
<hr/>			
100.00			<hr/> 100.00

Coke swollen, vitreous, laminate.

#### BRIDENBAUGH'S COAL K.

On section 27, township 1 north, range 5, two feet eight inches thick ; semi-caking coal ; upper part laminated ; lower part cubical with calcite in the cleavage partings.

Upper part:

Specific gravity, 1.273; one cubic foot weighs 79.56 lbs.

Coke,	-	-	56.50	{	Ash, red,	-	-	-	4.00
				{	Fixed carbon,	-	-	-	52.50
Volatile matter,			43.50	{	Water,	-	-	-	6.50
				{	Gas,	-	-	-	37.00
<hr/>								<hr/>	
100.00								100.00	

Coke laminate, dull, not puffed.

Middle part:

Specific gravity, 1.265; one cubic foot weighs 79.06 lbs.

Coke,	-	-	55.00	{	Ash, light red,	-	-	-	3.50
				{	Fixed carbon,	-	-	-	51.50
Volatile matter,			45.00	{	Water,	-	-	-	4.50
				{	Gas,	-	-	-	40.50
<hr/>								<hr/>	
100.00								100.00	

Coke dull, laminate.

Lower part:

Specific gravity, 1.246; one cubic foot weighs 77.87 lbs.

Coke,	-	-	56.00	{	Ash, red,	-	-	-	3.50
				{	Fixed carbon,	-	-	-	52.50
Volatile matter,			44.00	{	Water,	-	-	-	5.00
				{	Gas,	-	-	-	39.00
<hr/>								<hr/>	
100.00								100.00	

Coke laminate, dull, slightly puffed.

#### RUDOLPH'S COAL K.

On section 20, township 1 north, range 5, one mile west of Portersville, seam three feet thick. Specific gravity, 1.361; one cubic foot weighs 78.81 lbs.

Coke,	-	-	52.50	{	Ash, red,	-	-	-	4.00
				{	Fixed carbon,	-	-	-	48.50
Volatile matter,			47.50	{	Water,	-	-	-	5.50
				{	Gas,	-	-	-	42.00
<hr/>								<hr/>	
100.00								100.00	

Coke laminate, lustreless, not swollen.

Only the upper part of this seam has been analysed, for want of time. It is a bright, black caking coal, excellent for steam and blacksmiths' use.

#### JOE STEIN'S COAL.

On section 53, township 1 south, range 4, one and a half miles south of the line of the Evansville & Sandusky Railway; seam reported two feet thick.

Specific gravity, 1.260; one cubic foot weighs 78.75 lbs.

Coke,	-	-	52.00	{	Ash, brown,	-	-	3.50
				{	Fixed carbon,	-	-	48.50
·Volatile matter,			48.00	{	Water,	-	-	4.50
				{	Gas,	-	-	43.50
<hr/>								
100.00				<hr/>				
				100.00				

Coke swollen, laminate, lustreless.

#### MICHAEL WILSON'S COAL K.

One quarter of a mile north of Jasper; semi-block and block; three feet thick; color, dull black. The middle part of the seam is excellent coal.

Specific gravity, 1.416; one cubic foot weighs 88.50 lbs.

Coke,	-	-	55.50	{	Ash, white,	-	-	2.50
				{	Fixed carbon,	-	-	53.00
·Volatile matter,			44.50	{	Water,	-	-	4.00
				{	Gas,	-	-	40.50
<hr/>								
100.00				<hr/>				
				100.00				

Coke laminate, not swollen, vitreous.

The following analysis was made of another specimen from the same mine:

Specific gravity, 1.286; one cubic foot will weigh 80.37 pounds.

·Coke,	-	-	49.50	{	Ash, red,	-	-	5.00
				{	Fixed carbon,	-	-	44.50
Volatile matter,			50.50	{	Water,	-	-	6.00
				{	Gas,	-	-	44.50
<hr/>								
100.00				<hr/>				
				100.00				

Coke brilliant, laminate, slightly swollen.

## ADAM SMITH'S COAL K?

Three and a half miles south of Jasper, on section 11, township 2 south, range 5; the seam is from 3 ft. 6 in. to 4 feet thick.

Upper part, bright caking coal:

Specific gravity, 1.256; one cubic foot weighs 78.50 lbs.

Coke,	-	-	47.00	{	Ash, white,	-	-	-	3.50
				{	Fixed carbon,	-	-	-	43.50
Volatile matter,			53.00	{	Water,	-	-	-	7.00
				{	Gas,	-	-	-	46.00
								<hr/>	
								100.00	
								<hr/>	
								100.00	

Coke swollen, amorphous, vitreous.

Middle part, block coal:

Specific gravity, 1.335; one cubic foot weighs 83.43 lbs.

Coke,	-	-	51.50	{	Ash, white,	-	-	-	2.50
				{	Fixed carbon,	-	-	-	49.00
Volatile matter,			48.50	{	Water,	-	-	-	5.00
				{	Gas,	-	-	-	43.00
								<hr/>	
								100.00	
								<hr/>	
								100.00	

Coke not swollen, laminate, lustreless.

Lower part, semi-block coal:

Specific gravity, 1.261; one cubic foot weighs 78.81 lbs.

Coke,	-	-	49.00	{	Ash, gray,	-	-	-	4.50
				{	Fixed carbon,	-	-	-	44.50
Volatile matter,			51.00	{	Water,	-	-	-	5.50
				{	Gas,	-	-	-	45.50
								<hr/>	
								100.00	
								<hr/>	
								100.00	

Coke swollen, laminate, brilliant.

Taken altogether this is an excellent coal for manufacturing and general use.

It is on the line of the proposed railways through this county.

## BRETZVILLE COAL A?

In the cut of the New Albany & St. Louis Air Line Railway; said to be three and a half feet thick:

Specific gravity, 1.275; one cubic foot weighs 79.68 lbs.

Coke,	-	-	52.50	{	Ash, white,	-	-	-	3.50
				{	Fixed carbon,	-	-	-	49.00
Volatile matter,			47.50	{	Water,	-	-	-	4.50
				{	Gas,	-	-	-	43.00
				<hr/>					
				100.00					100.00

Coke laminated, vitreous, not swollen.

The cut where this coal shows was partly filled with water, so that a good view could not be had of the seam, to determine its actual thickness. It is a very good block coal.

Analyses of coals from Pike county, collected by Prof. John Collett, and referred to in his report:

#### THOS. CASE'S COAL L?

On section 19, township 1 north, range 6, near White river, and one mile east of High Bank; color, bright; fracture cubical; contains seams of calcite in the cleavage partings; seam two feet thick.

Specific gravity, 1.280; one cubic foot weighs 80. lbs.

Coke,	-	-	49.50	{	Ash, fawn,	-	-	-	4.00
				{	Fixed Carbon,	-	-	-	45.50
Volatile matter,			50.50	{	Water,	-	-	-	3.50
				{	Gas,	-	-	-	47.00

Coke swollen, lustreless, amorphous.

#### BENNETT'S COAL K.

On section 7, township 1 north, range 7, on Mud creek, near White river, in the northern part of the county; the seam is six feet thick; dull black color; laminated, and breaks into small cubes; it is a caking coal.

Specific gravity, 1.268; one cubic foot weighs 79.25 lbs.

Coke,	-	-	49.00	{	Ash, brown,	-	-	-	3.50
				{	Fixed carbon,	-	-	-	45.50
Volatile matter,			51.00	{	Water,	-	-	-	6.00
				{	Gas,	-	-	-	45.00

Coke swollen, laminate and vitreous.



## ALEXANDER'S COAL N.

On section 33, township 1 north, range 8, one and a half miles southwest of Petersburg; is a semi-caking coal; the seam is from 3 ft. 6 in. to 6 ft. thick, will average 4 feet.

Specific gravity, 1.284; one cubic foot weighs 80.25 lbs.

Coke,	-	-	52.50	{	Ash, white,	-	-	-	3.00
				{	Fixed carbon,	-	-	-	49.50
Volatile matter,			47.50	{	Water,	-	-	-	6.00
				{	Gas,	-	-	-	41.50
<hr/>								<hr/>	
100.00								100.00	

No record was made of the appearance of the coke.

The following analysis was made of another specimen from the same seam:

Specific gravity, 1.259; one cubic foot weighs 78.69 lbs.

Coke,	-	-	56.00	{	Ash, white,	-	-	-	4.00
				{	Fixed carbon,	-	-	-	62.00
Volatile matter,			44.00	{	Water,	-	-	-	8.00
				{	Gas,	-	-	-	36.00
<hr/>								<hr/>	
100.00								100.00	

Coke puffed, vitreous, amorphous.

This is an excellent steam and grate fuel; burns without clinker, and will probably prove to be a good gas coal.

## OWNER UNKNOWN, COAL K.

On section 2, township 2 south, range 8, at the mouth of Barren creek, two and a quarter miles west of Winslow; caking coal; color, dull black; is four feet eight inches thick, and contains some iron pyrites in the seams.

Specific gravity, 1.268; one cubic foot weighs 79.25 lbs.

Coke,	-	-	51.00	{	Ash, white,	-	-	-	3.00
				{	Fixed carbon,	-	-	-	48.00
Volatile matter,			49.00	{	Water,	-	-	-	4.50
				{	Gas,	-	-	-	44.50
<hr/>								<hr/>	
100.00								100.00	

Coke much puffed, vitreous, amorphous.

## DR. POSEY'S COAL K.

Four miles northeast of Petersburg, on sections 12 and 13, township 1 north, range 8; it is ten feet thick and will average about six feet; is a caking coal.

## Upper part:

Specific gravity, 1.288; one cubic foot weighs 80.50 lbs.

Coke,	-	-	53.50	{	Ash, lead color,	-	-	5.50
				{	Fixed carbon,	-	-	48.00
Volatile matter,			46.50	{	Water,	-	-	6.50
				{	Gas,	-	-	40.00
<hr/>								
100.00								<hr/> 100.00

Coke slightly puffed, vitreous, amorphous.

## Middle part:

Specific gravity, 1.275; one cubic foot weighs 79.68 lbs.

Coke,	-	-	52.00	{	Ash, fawn.	-	-	4.00
				{	Fixed carbon,	-	-	48.00
Volatile matter,			48.00	{	Water,	-	-	7.00
				{	Gas,	-	-	41.00
<hr/>								
100.00								<hr/> 100.00

Coke puffed, brilliant, amorphous.

## Bottom part:

Specific gravity, 1.244; one cubic foot weighs 77.75 lbs.

Coke,	-	-	56.50	{	Ash, brown,	-	-	6.00
				{	Fixed carbon,	-	-	50.50
Volatile matter,			43.50	{	Water,	-	-	5.50
				{	Gas,	-	-	38.00
<hr/>								
100.00								<hr/> 100.00

Coke lamellar, brilliant, not puffed.

This is a good coal for steam and blacksmithing. It contains a large per centage of gas, and it is reported that it was used at the Gas Works in Evansville, when the Wabash and Erie Canal, which ran close by the mine, was in operation.

## SHANDY'S COAL K.

## Upper part:

On section 13, township 1 north, range 8, near Dr. Posey's; the seam is from 5 to 8 feet thick.

Specific gravity, 1.279; one cubic foot weighs 79.94 lbs.

Coke, - -	56.50	{	Ash, white, - -	5.00
		{	Fixed carbon, - -	51.50
Volatile matter, -	43.50	{	Water, - -	6.50
		{	Gas, - -	37.00
	<u>100.00</u>			<u>100.00</u>

Coke brilliant, lamellar, slightly swollen.

## Lower part:

Specific gravity, 1.270; one cubic foot weighs 79.37 lbs.

Coke, - -	52.50	{	Ash, white, - -	3.50
		{	Fixed carbon, - -	49.00
Volatile matter, -	47.50	{	Water - -	6.00
		{	Gas, - -	41.50
	<u>100.00</u>			<u>100.00</u>

Coke lustreless, amorphous, puffed.

This coal is similar in character and quality to Dr. Posey's.

## DE BRULER'S COAL K.

On section 8, township 1 north, range 7, two miles north-east of Dr. Posey's, and five miles northeast of Petersburg; this is a caking coal and the seam is from five to seven feet thick.

## Top part of the seam:

Specific gravity, 1.294; one cubic foot weighs 80.87 lbs.

Coke, - -	47.00	{	Ash, blue, - -	5.00
		{	Fixed carbon, - -	42.00
Volatile matter, -	53.00	{	Water, - -	8.00
		{	Gas, - -	45.00
	<u>100.00</u>			<u>100.00</u>

Coke very much puffed, lustreless.

Middle part of seam :

Specific gravity, 1.271; one cubic foot weighs 79.43 lbs.

Coke,	-	-	50.00	{	Ash, brown,	-	-	-	5.50
				{	Fixed carbon,	-	-	-	44.50
Volatile matter,			50.00	{	Water,	-	-	-	6.00
				{	Gas,	-	-	-	44.00
<hr/>								<hr/>	
100.00								100.00	

Coke puffed, lustreless.

Lower part of seam :

Specific gravity, 1.268; one cubic foot will weigh 79.25 pounds.

Coke,	-	-	53.50	{	Ash, blue,	-	-	-	3.50
				{	Fixed carbon,	-	-	-	50.00
Volatile matter,			46.50	{	Water,	-	-	-	6.50
				{	Gas,	-	-	-	40.00
<hr/>								<hr/>	
100.00								100.00	

Coke puffed and lustreless.

Good steam and blacksmith's coal.

#### CROWE'S COAL L.

On section 10, township 1 north, range 7, three miles north of Algiers; color, dull black; seam three and a half to four feet; caking coal with a cubical fracture.

Upper part of seam :

Specific gravity, 1.274; one cubic foot weighs 79.62 lbs.

Coke,	-	-	56.00	{	Ash, fawn,	-	-	-	3.50
				{	Fixed carbon,	-	-	-	52.50
Volatile matter,			44.00	{	Water,	-	-	-	8.50
				{	Gas,	-	-	-	35.50
<hr/>								<hr/>	
100.00								100.00	

Coke puffed, vitreous, amorphous.

Lower part of seam :

Specific gravity, 1.262; one cubic foot weighs 78.87 lbs.

<b>Coke,</b>	-	-	56.40	{	Ash, gray,	-	-	-	8.50
				{	Fixed carbon,	-	-	-	47.90
<b>Volatile matter,</b>			43.60	{	Water,	-	-	-	8.50
				{	Gas,	-	-	-	35.10
			<hr/> 100.00						<hr/> 100.00

**Coke vitreous, swollen, puffed.**

This is a good coal, has an excellent reputation wherever known, stands exposure to the weather, and large quantities have been shipped to southern points, by the river, from this mine.

**TURNER SMITH'S COAL N.**

On section 4, township 1 south, range 8, two miles southwest of Petersburg. The seam is 4 feet thick; is a caking coal with cubical fracture and contains seams of calcite in the partings:

**Specific gravity, 1.279; one cubic foot weighs 79.93 lbs.**

Coke,	-	-	56.00	{	Ash, white,	-	-	2.50
				{	Fixed carbon,	-	-	53.50
Volatile matter,			44.00	{	Water,	-	-	5.50
				{	Gas,	-	-	38.50
			<hr/> 100.00					<hr/> 100.00

**Coke much puffed, vitreous, amorphous.**

## HAWTHORN & GLEASON'S COAL L.

In an old shaft sunk below the bed of White river at High Bank, one and a half miles north of Petersburg, on section 15, township 1 north, range 8; reported to be 8 feet 6 inches thick. The shaft has been abandoned and is now full of water. The specimen analyzed was taken from a bill where it had been exposed for several years; it is a caking coal, and this specimen contains a large percentage of ash.

**Specific gravity, 1.269 ; one cubic foot weighs 79.31 lbs.**

Coke, - -	59.50	{	Ash, gray, - -	14.00
		{	Fixed carbon, - -	45.50
Volatile matter,	40.50	{	Water, - - -	8.50
		{	Gas, - - -	32.00
<hr/>				<hr/>
100.00				100.00

Coke unchanged, dull, laminate.

#### BARR'S COAL M.

On the bank of the Wabash and Erie Canal, four miles south of Petersburg, on section 15, township 1 south, range 8; is a caking coal and the seam is 2 feet 6 inches thick.

Specific gravity, 1.260; one cubic foot weighs 78.75 lbs.

Coke, - -	60.50	{	Ash, white, - -	3.50
		{	Fixed carbon, - -	57.00
Volatile matter,	39.50	{	Water, - - -	7.00
		{	Gas, - - -	32.50
<hr/>				<hr/>
100.00				100.00

Coke puffed, vitreous.

This is a good strong coal for heating purposes.

#### FALL'S COAL N?

Near Centerville, on section 24, township 1, range 9; the seam is 3 feet 10 inches thick; the upper part, semi-block; while the lower part is a choice caking coal.

Upper part of seam:

Specific gravity, 1.274; one cubic foot weighs 79.62 lbs.

Coke, - -	52.00	{	Ash, fawn, - -	5.00
		{	Fixed carbon, - -	47.00
Volatile matter,	48.00	{	Water, - - -	5.50
		{	Gas, - - -	42.50
<hr/>				<hr/>
100.00				100.00

Coke dull, laminate, slightly puffed.

Lower part of seam:

Specific gravity, 1.268; one cubic foot weighs 79.25 lbs.

Coke, - -	55.50	{	Ash, white, - - -	4.00
		{	Fixed carbon, - -	51.50
Volatile matter,	41.50	{	Water, - - -	7.50
		{	Gas, - - -	37.00
	<hr/>			<hr/>
	100.00			100.00

Coke vitreous, puffed, amorphous.

#### DE TAR'S COAL A.

Two miles east of Pikesville, on section 28, township 2 south, range 6; the seam is from 2 to 3 feet thick, the upper part of which is cannel, and the lower part a good article of caking coal.

Upper part of seam:

Specific gravity, 1.444; one cubic foot weighs 90.25 lbs.

Coke, - -	55.50	{	Ash, red, - - -	14.00
		{	Fixed carbon, - -	41.50
Volatile matter,	44.50	{	Water, - - -	7.50
		{	Gas, - - -	37.00
	<hr/>			<hr/>
	100.00			100.00

Coke laminate, brilliant, not puffed.

Lower part of seam:

Specific gravity, 1.288; one cubic foot weighs 80.50 lbs.

Coke, - -	54.50	{	Ash, dark red, - -	5.00
		{	Fixed carbon, - -	49.50
Volatile matter,	45.50	{	Water, - - -	5.50
		{	Gas, - - -	40.00
	<hr/>			<hr/>
	100.00			100.00

Coke much puffed, glossy, laminate.

#### BEE'S COAL K.

Two miles east of the new town of Arthur, on the New Albany and St. Louis Air Line Railway, on section 17, township 2 south, range 7; the seam is eighteen inches thick and is a non-caking coal.

Specific gravity, 1.269 ; one cubic foot weighs 79.31 lbs.

Coke, - -	58.50	{	Ash, dark brown, -	14.00
		{	Fixed carbon, -	44.50
Volatile matter,	41.50	{	Water, - - -	4.50
		{	Gas, - - -	37.00
<hr/>				<hr/>
100.00				100.00

Coke compact, vitreous, laminate.

#### MOULTON'S COAL K.

One and a half miles northeast of Winslow, on section 28, township 1 south, range 7 ; this is a caking coal, and the seam is about 5 feet thick.

The upper part has a laminate structure, is rich in gas, and burns with a large flame.

The middle part is more compact and glossy, and contains some pyrites.

The lower part has a cubical fracture.

Upper part of seam :

Specific gravity, 1.244 ; one cubic foot weighs 77.80 lbs.

Coke, - -	51.50	{	Ash, lead color, -	3.50
		{	Fixed carbon, -	48.00
Volatile matter,	48.50	{	Water, - - -	5.50
		{	Gas, - - -	43.00
<hr/>				<hr/>
100.00				100.00

Coke much puffed, amorphous, lustreless.

Middle part of seam :

Specific gravity, 1.257 ; one cubic foot weighs 78.56 lbs.

Coke, - -	59.00	{	Ash, dark red, -	8.50
		{	Fixed carbon, -	50.50
Volatile matter,	41.00	{	Water, - - -	4.50
		{	Gas, - - -	36.50
<hr/>				<hr/>
100.00				100.00

Coke laminate, slightly swollen, lustrous.



Lower part of seam :

Specific gravity, 1.257 ; one cubic foot weighs 78.56 lbs.

Coke, - -	52.50	{	Ash, white,	-	-	3.00
			Fixed carbon,	-	-	49.50
Volatile matter,	47.50	{	Water,	-	-	6.00
			Gas,	-	-	41.50
<hr/>						<hr/>
100.00						100.00

Coke puffed, amorphous, lustreless.

#### THOMAS' COAL K.

Half a mile north of Winslow, on section 32, township 1 south, range 7 ; the seam is five feet thick, and is a caking coal similar in quality to the above.

Specific gravity, 1.280 ; one cubic foot weighs 80.00 lbs.

Coke, - -	52.50	{	Ash, white,	-	-	4.00
			Fixed carbon,	-	-	48.50
Volatile matter,	47.50	{	Water,	-	-	7.00
			Gas,	-	-	40.50
<hr/>						<hr/>
100.00						100.00

Coke amorphous, puffed and lustreless.

#### WELLS & WHITMAN'S COAL L.

One and a half miles west of Winslow, on section 36, township 1 south, range 8, and on the south side of Patoka river ; the seam is five feet thick, and is a caking coal.

Upper part of seam :

Specific gravity, 1.294 ; one cubic foot weighs 80.87 lbs.

Coke, - -	55.00	{	Ash, white,	-	-	2.50
			Fixed carbon,	-	-	52.50
Volatile matter,	45.00	{	Water,	-	-	8.00
			Gas,	-	-	37.00
<hr/>						<hr/>
100.00						100.00

Coke slightly puffed, laminate, vitreous.

Middle part of seam :

Specific gravity, 1.278 ; one cubic foot weighs 79.87 lbs.

Coke, - -	52.50	{	Ash, white, - -	2.00
		{	Fixed carbon, - -	50.50
Volatile matter,	47.50	{	Water, - - -	6.00
		{	Gas, - - -	41.50
<hr/>				
100.00				100.00

Coke puffed, vitreous, laminate.

Lower part of seam :

Specific gravity, 1.275 ; one cubic foot weighs 79.68 lbs.

Coke, - -	53.00	{	Ash, white, - -	2.50
		{	Fixed carbon, - -	50.50
Volatile matter,	47.00	{	Water, - - -	5.00
		{	Gas, - - -	42.00
<hr/>				
100.00				100.00

Coke puffed, vitreous, laminate.

This is altogether a most excellent coal and well adapted for steam, manufacturing and household uses.

#### G. W. MASSEY'S COAL L.

On the south bank of Patoka river, two miles north of the New Albany and St. Louis Air Line Railway, on section 4, township 2 south, range 8 ; this is a caking coal and the seam ranges from 6 to 10 feet in thickness.

Upper part of seam :

Specific gravity, 1.268 ; one cubic foot weighs 79.25 lbs.

Coke, - -	57.00	{	Ash, light gray, - -	3.50
		{	Fixed carbon, - -	53.50
Volatile matter,	43.00	{	Water, - - -	8.50
		{	Gas, - - -	34.50
<hr/>				
100.00				100.00

Coke brilliant, compact, laminate.

Lower part of seam :

Specific gravity, 1.279 ; one cubic foot weighs 79.93 lbs.

Coke, - - 56.50	{	Ash, white, - -	1.50
	{	Fixed carbon, - -	55.00
Volatile matter, 43.50	{	Water, - - -	7.00
	{	Gas, - - - -	36.50
<hr/>			
100.00			100.00

Coke brilliant, slightly puffed, laminate.

This is a good coal for general fuel and steam purposes.

#### THOMAS MARTIN'S COAL L.

One and a half miles north of the N. A. & St. L. A. L. Ry., on section 9, township 2 south, range 8; the seam is from 7 to 9 feet 6 inches thick, and is a caking coal.

Upper part of seam:

Specific gravity, 1.258; one cubic foot weighs 78.62 lbs.

Coke, - - 55.50	{	Ash, gray, - -	3.50
	{	Fixed carbon, - -	52.00
Volatile matter, 44.50	{	Water, - - -	7.50
	{	Gas, - - - -	37.00
<hr/>			
100.00			100.00

Coke, much puffed, vitreous, amorphous.

Middle part of seam:

Specific gravity, 1.269; one cubic foot weighs 79.31 lbs.

Coke, - - 60.00	{	Ash, light gray, - -	3.00
	{	Fixed carbon, - -	57.00
Volatile matter, 40.00	{	Water, - - -	6.50
	{	Gas, - - - -	33.50
<hr/>			
100.00			100.00

Coke puffed, vitreous, amorphous.

Lower part of seam:

Specific gravity, 1.275; one cubic foot weighs 79.68 lbs.

Coke, - - 57.50	{	Ash, white, - -	2.50
	{	Fixed carbon, - -	55.00
Volatile matter, 42.50	{	Water, - - -	7.50
	{	Gas, - - - -	35.00
<hr/>			
100.00			100.00

Coke puffed, vitreous, slightly laminate.

This is a splendid, mammoth seam of coal, well adapted for steam and household uses.

P. S. TEVAULT'S COAL K.

Three miles east of Pleasantville, on section 16, township 3 south, range 7; the seam is about 5 feet thick caking coal and a very good fuel.

Specific gravity, 1.245; one cubic foot weighs 77.81 lbs.

Coke, - -	52.50	{	Ash, white, - -	3.00
		{	Fixed carbon, - -	49.50
Volatile matter, -	47.50	{	Water, - - -	7.00
		{	Gas, - - -	40.50
<hr/>				<hr/>
100.00				100.00

Coke much puffed, amorphous, lustreless.

The analyses of the following coals from Warrick county will serve to show their relation to the coals of Dubois and Pike counties.

WOOD'S COAL K.

Two miles southeast of Holland, on section 19, township 4 south, range 5; this is a caking coal, and the seam is three feet thick. It is a good coal, contains a large percentage of gas, burns with a large flame, and is considered excellent for blacksmithing.

Specific gravity, 1.272; one cubic foot weighs 79.50 lbs.

Coke, - -	48.00	{	Ash, white, - -	3.00
		{	Fixed carbon, - -	45.00
Volatile matter, -	52.00	{	Water, - - -	4.50
		{	Gas, - - -	47.50
<hr/>				<hr/>
100.00				100.00

Coke much puffed, lustreless, amorphous.

INGHAM'S COAL K?

Two miles north of Taylorsville, on section 5, township

3 south, range 6 ; this is a block coal, and the seam is two feet six inches thick.

Upper part of seam :

Specific gravity, 1.280 ; one cubic foot weighs 80. lbs.

Coke, - -	51.00	{	Ash, white,	-	-	2.00
			Fixed carbon,	-	-	49.00
Volatile matter,	49.00	{	Water,	-	-	7.50
			Gas,	-	-	41.50
<hr/>						<hr/>
100.00						100.00

Coke slightly puffed, laminate, vitreous.

Lower part of seam :

Specific gravity, 1.311 ; one cubic foot weighs 81.93 lbs.

Coke,        -        -        52.50	{	Ash, white,	-        -        2.00
		Fixed carbon,	-        -        50.50
Volatile matter,    47.50	{	Water,	-        -        -        6.50
		Gas,	-        -        -        -        41.00
<hr/>			<hr/>
100.00			100.00

Coke laminate, vitreous, not puffed.



## PERRY COUNTY.

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This county was organized in 1814, and named in honor of the gallant Commodore Oliver Hazard Perry.\*

It is bounded on the north by Dubois and Crawford counties, on the east by Crawford county and the Ohio river, on the south by the Ohio river, and on the west by Spencer and Dubois counties.

It is divided into seven civil townships—Troy, Tobin, Union, Leopold, Oil, Clark and Anderson.

The tortuous course of the Ohio river gives to this county a river front of about fifty miles, and its interior is also well supplied with water by the numerous rivulets which find their way to that stream and to Anderson creek; a large tributary which flows along the western border of the county in a southerly direction to its confluence with the Ohio.

The direction taken by the main water courses in this county is, in a great measure, due to the character of the rocky strata which gives prominence to its geology.

The hydrographic basin through which the Ohio river winds its way to the great Mississippi river, crosses the outcrop edges of the geological strata at nearly right angles to their line of strike. Whenever, therefore, the stream encountered a stratum that offered more than ordinary resistance to abrasion, the course of the river is turned from its main direction and compelled to take a northerly or southerly one, following very nearly, if not quite, along the line of strike

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\*Indiana Gazetteer.

until it reached a part which offered less resistance, or when accumulating, it acquired sufficient force, broke through the rocky barrier. The Wabash river, and White river with its two principal branches—the East and West Forks—flow across the State of Indiana from east to west, with northerly and southerly bearings that conform very closely to those taken by the Ohio. This indicates that they cross the same strata, and have the same geological difficulties to contend with. The Wabash river, when it reached the heavy bedded sandstone of the millstone grit series, on the western border of the State, near Williamsport, in Warren county, turned its course, and flowing in a southerly direction, along the general outcrop lines of the carboniferous strata, cut its way to its confluence with the Ohio, between bluffs of sandstone which here and there present bold escarpments.

The directions taken by the Ohio river to overcome the geological difficulties in its way may be compared to the course taken by a ship when tacking to make way against a head wind.

This generalization regarding the influence of the geological strata in directing the course of rivers is, at this time, very crudely presented, but with the progress of the survey I hope to bring forward an array of facts obtained by detailed observations that will serve to more fully illustrate this subject.

If we look at the map, it will be seen that the Ohio river, on reaching Perry county, turns in a southerly direction and flows along the outcropping edges of the lower carboniferous limestones with but little if any change in geological levels, until a point is reached near Cloverport, where it crosses the obscurely bassetting edges of the strata and cuts its way in a northerly direction across the millstone grit, which it first meets in great force near the mouth of Deer creek, and that it is only when it reaches Troy that it has found a geological level about 100 feet above the millstone grit. From Troy, the course is southerly and again approaches the outcropping line of the rocks and crosses



the last barrier of millstone grit in Indiana at Rockport, where it is represented by the "Martha Washington Rock."

The head waters of Anderson creek cross the strata from east to west in a corresponding manner, and the main body of the stream keeps along the strike line of the strata to its mouth, and the Cannelton seam of coal may be found by outcrops or shallow shafts from St. Meinrad's, in the edge of Spencer county, to Troy. Deer creek follows the same law, but its bed occupies a little lower geological level, and the lower carboniferous limestone is seen along the main stream and its eastern branches.

By far the greater portion of this county is broken, and the hills, which are from two to four hundred feet in height, are often capped with massive sandstone, which gives rise to picturesque and rugged scenery, but affords no great attraction for the agriculturist. In the valleys, however, there are small streams with narrow fertile borders and the extensive bottoms along the Ohio river are unsurpassed in fertility.

The location of the seat of justice has been changed twice since the organization of this county. It was first located at Troy, on the Ohio river near the mouth of Anderson creek. From Troy it was removed to Rome, on the Ohio river in Tobin township, and finally found a resting place at Cannelton, where, in all probability, it will remain.

Cannelton is a flourishing town and has long been noted for its mining and manufacturing enterprises. It was first laid out in 1835, and very soon afterward was purchased by the American Cannel Coal Company. This organization with a capital of \$500,000, purchased 7,000 acres of land adjoining the town, most of which was underlaid with coal. The object of this company was to avail themselves of the advantages which this location offered for procuring cheap fuel at the lowest possible rates, and to build up manufactures on a large scale. To carry out these views and to promote the growth of the town, large lots were laid out for cotton and other mills; coal mines were opened and railroads laid from thence to the river; and coal was furn-

ished at a rental of one cent per bushel to manufacturers. Charters were obtained for the erection of two cotton mills, but only one, the Cannelton Cotton Mill which is now in successful operation, was built. As a reflex of the views held by the American Cannel Coal Company I quote a paragraph from the Indiana Gazetteer published in 1849, page 353.

“This enterprise is intended to be but the beginning of a movement which may result in giving the control of the price of cotton to the country where it is produced. It may, too, operate as a check to over production by giving cotton planters other means of investment besides lands and slaves, and it may result in changing the character of the present cotton manufacturing districts of the world, for the coal districts in the vicinity and the fertile and healthy regions around present opportunities for the increase of manufactures to unlimited extent. The wealth of Indiana may eventually be concentrated in this part of the State which was so long overlooked by immigrants. The present improvements at Cannelton owe their origin to General Seth Hunt, of New Hampshire, a man of singular intelligence and energy, who, in connection with Messrs Hobart, Williams and Russell, then wealthy capitalists of Boston, formed the American Cannel Coal Company, purchased the lands and made several entries to the coal strata.” \* \* \*

The Cannelton Cotton Mill is built of grayish brown sandstone, procured from the hills just back of the mills, and is 272 feet long, 65 feet wide and four stories high. In elegance of design and general appearance these mills are unsurpassed, if equaled by any in the country. I was shown through the building by Mr. James Lee, the intelligent and courteous gentleman in charge of the engine, which is placed in a room as neat as a parlor and kept scrupulously clean. The mill contains 10,800 spindles, 372 looms, employs 375 hands, uses 13 bales of cotton and turns out 15,000 yards of standard brown sheeting per day. The mill has recently been repaired and fitted up with the most approved new machinery, purchased in England, at a cost of about \$100,000.

The Hon. Hamilton Smith is at present, and has been for many years, President and chief manager of the American Cannel Coal Company's business, and it is to this distinguished gentleman, more than to any other, that Cannelton owes its mining and manufacturing prosperity. He is a man of high intellectual culture; the walls of his dwelling are adorned with rare paintings, some of which are by the "old masters" and of great value, and his library is probably the largest and most valuable in the State. He has made Cannelton his home since its purchase, which through him was accomplished for the Company, and with his family and books for companions, he has given his time to the study of the great work before him; and as the result of his far-seeing policy, probably nowhere in the country is coal mining managed so completely to the satisfaction of the miner and owner. The secret of the success which attends President Smith's management of these mines may be traced to the fact that most of the employes have been induced to become property owners. I was informed that he had himself made over four hundred and fifty-two free holders. Being owners of homesteads they have a common interest in the general prosperity of the country and the success of the mining enterprises upon which they are dependent for the means of supporting their families. For this reason, also, they are generally sober, industrious men, who send their children to school and accumulate wealth.

Belonging to the Cotton Mill Company there is a mill for making cotton batting. Three bales of cotton are worked daily into batting, and the engine does the double duty of pumping water from the Ohio river to supply the cotton mill.

The other important manufactures of Cannelton are Clark Brothers' extensive stoneware sewer pipe manufactory. These pipes are from three to twenty-two inches in diameter. The clay used in their manufacture is the bottom or fire-clay immediately under the "top coal." The seam is three to six feet thick and the clay is well adapted for the purpose. The pipes are hard, close-grained, very strong, perfect in

shape and free from cracks and flaws. Their kiln is one of the largest in the country and they turn out about fifty thousand dollars' worth of pipes per year. About three hundred and fifty bushels of coal are required to burn a kiln. They employ about twenty hands. Close by this sewer pipe manufactory is William Clark's stoneware, fruit-jar and milk-pan pottery. This ware is made of clay from the same seam worked by Clark Brothers, and by the aid of an ingenious machine which Mr. Clark has invented for washing the clay, he is enabled to make a superior article of milk-pans. He burns about eighteen thousand crocks a month, and the ware sells readily for eight and a half cents per gallon at the works.

A chair factory owned by Bunts & Smith, and a paper mill owned by the Paper Mill Company, F. Sulzer, President, and Roan Clark Secretary, were built this year, and were about ready to commence operations in November.

Besides the above named factories there are a number of lesser establishments which also serve to point to the general prosperity of the place. Of these I can not pass unnoticed a small mill for crushing and pulverizing bones for fertilizing purposes. It is owned by Mr. Henry Hicks, and though simple in its construction answers the purpose well for which it was designed. It has three cast iron stamps, each weighing about 350 pounds, that are raised and dropped alternately upon the bones which are placed on an iron slab forming the bottom of a box under the stamps. The bones are by this means pulverized into a fine powder, and the daily product of the mill is 500 pounds. Mr. Hicks pays half a cent per pound for bones and sells the prepared dust at two and a half cents. Forty pounds scattered over an acre of ground, or a tablespoonfull to a hill of corn is the usual quantity used for fertilization. The yield of all kinds of grains, grasses and root crops is materially increased by the use of bone dust, and there is ready sale for all that the mill can make.

## TELL CITY.

This flourishing young city, growing upon our southern border with a rapidity that is truly remarkable, is situated on the Ohio river, three miles below Cannelton, one hundred and twenty-five miles below Louisville and seventy-five miles above Evansville. The site was purchased in 1858 by the Swiss Colonization Society, a colony of generous men who were attracted to the locality on account of the coal which gave a surety of cheap fuel, and the fine oak, poplar, walnut, hickory and other trees which would supply timber for manufacturing purposes. They at once commenced to lay out the town and build houses where they could enjoy freedom and reap the full benefit of their labor. The principal streets are graded and Macadamized with gravel and ferruginous clay, obtained from the hills near by. This material cements and makes a hard, durable road. There are no drones in the town which is now said to contain a population of about three thousand. And by persevering industry, and encouraging and extending aid to mechanics who settle among them, manufactures have been built up which are now turning out many thousands of dollars worth of goods that find a ready market in the towns to the south and west.

The following are the most important manufactures: Tell City Furniture Company, organized in 1859 on a capital of ten thousand dollars, now represents a capital of two hundred thousand dollars; employs one hundred hands and turns out a hundred thousand dollars worth of goods annually.

The Cabinet Makers' Union was organized in 1868. They employ eighty-five men, and turn out seventy-five thousand dollars worth of furniture annually.

Coombs, Hartman & Company's Chair Factory employs sixty-five men, and makes annually seventy thousand dollars worth of chairs.

Chair Makers' Union. This company employs twenty-

five men, and makes thirty thousand dollars worth of chairs annually.

Herman & Brothers. This firm commenced manufacturing their patent axle-wagons in 1866 on a very limited capital, which by industry and the superiority of their work, was very rapidly increased, so that now they are employing thirty men and sell annually forty thousand dollars worth of wagons. These wagons are held in high esteem and meet with a ready sale in the Southern and Western States.

Lyon & Sedletsky, is a firm recently organized for the purpose of erecting a furniture factory. The building and machinery are nearly ready for operation, and they will employ about seventy-five men.

Sylvester Raney, an enterprising young man, is erecting a barrel and stave factory, which will be in operation by the close of the year.

The Tell City Planing Mill Company have a large establishment and are doing a fine business.

Wildman & Obouisier have a foundry and machine shop, and also build engines. Their business is lucrative and growing.

Tell City Woollen Mills, owned by Michael Bettinger, is manufacturing Bettinger's "Gold Medal" Yarns. His business averages about twenty-five thousand dollars a year.

Charles Steinauer & Co. have a merchant mill which is turning out a large quantity of flour and mill feed.

Zines & Kappler's foundry for stoves and all kinds of castings is also doing a large amount of work.

F. Voelke has a large brewery and is shipping beer and ale to all the towns on the river to the south.

Charles Becker has a brewery and is also making considerable beer.

John Olrecht has an establishment for manufacturing brush-blocks and brushes; his blocks are shipped to all parts of the United States.

The Excelsior Saw Mill is owned by John Menninger, and cuts a large quantity of plank.

The shingle factory of Jacob Ruff is producing about twelve thousand shingles.

There is, also, here a distillery for making apple and peach brandy.

Besides the above there are a number of manufactories of less importance, but enough have been enumerated to show the prosperous condition of the city, and illustrate its rapid growth.

The city is also well supplied with merchants, who deal in all the commodities required by the country, and to facilitate trade Messrs. Whitton & Steiner have established a banking house which is doing a fine business.

Facilities for education have not been neglected by these busy people, for they have two large brick school houses where the children receive instruction in both the German and English languages.

The extent and marvelous growth of manufactures at this point furnishes a striking example of what a frugal and industrious people may accomplish by aiding and encouraging one another. All the manufacturing companies commenced with small means but they have managed to increase their business and accumulate fortunes.

The Swiss Colonization Society still offer to give town lots and otherwise assist all worthy mechanics who desire to start any branch of manufacturing business in their city.

Four miles below Tell City is the town of Troy, somewhat noted for its manufacture of Yellow or Troy ware. Some years ago a large company, consisting mostly of English capitalists, was organized to build extensive potteries at Troy, under the impression that the clay under the so-called "top seam" of coal would answer to make the ordinary white queensware; but after erecting the necessary buildings and large kilns they found that this clay was only suited for making yellow ware, and the pottery was finally abandoned and let go to ruin.

Two potteries have subsequently been started here and are doing a very fair business by making the Yellow or Troy ware. One of these potteries is owned by Samuel Wilson,

and the other by B. Hinch. The former makes annually about five thousand dollars worth of this ware and the latter not quite so much.

On Anderson creek, near Troy, there is a large establishment for making sash, doors and blinds.

Leopold, Rono, Derby and Rome are small towns; the former is in the interior of the county and settled principally by French. The Catholic Church at this place is an imposing structure, built of gray sandstone quarried in the neighborhood. Rono and Derby are thriving towns situated on the Ohio river. Rome, also on the river, is seven miles below Derby and has a fine location on the rich alluvial "bottom," but has decreased in population since the removal of the county seat to Cannelton. There are no other towns of any note in the county.

Between Cannelton and Tell City is a place called Fulton; there are no houses here, and the name is applied to an abandoned coal mine, which is on a tract of land that was given by the United States Government to Robert Fulton, the inventor of the steamboat who, in company with Mr. Livingston built, at Pittsburg, Pennsylvania, in 1812, the first steamboat that ever floated on the Western rivers; it was called the "Orleans" and made her first trip from Pittsburg to New Orleans in fourteen days.

It is said that this boat, on her first trip down the Ohio river, stopped at Fulton, and some coal from the mine was taken on board, whether for fuel or as a matter of curiosity, is not known.

It is proposed to erect at this place a monument in honor of Fulton; and it is to be hoped the project will be carried out. The location is a proper one, for no where has the invention of Fulton been more productive of beneficial results, or is more fully appreciated than on the beautiful Ohio. And a monument here would not only serve to remind the navigator of his obligations to genius, but will also serve to illustrate the ingratitude of a Republic, which, in possession of an almost boundless domain, could spare only a few acres, where it was of little value, to reward one



of its greatest benefactors. For who can estimate the value of Fulton's invention to a country so bountifully supplied with large rivers, and where its application has been productive of such marvelous results in developing its resources.

#### GEOLOGY.

The geological formations of this county embrace a portion of the lower carboniferous rocks, the greater part of the coal measures; a ferruginous gravel and sand which has by some been thought to belong to the tertiary; glacial drift, and a few patches of quaternary on the highest points along the Ohio river.

The following section will exhibit the sequence of the strata, leaving out the ferruginous gravel as its relative position with the drift has not been ascertained:

## GENERAL SECTION IN PERRY COUNTY.

SPACER.		FT.	IN.	
53.0		5.		Soil and clay.
		10?		Loess (local).
		15.		Drift (local).
		23		Sandstone and Shistose Sandstone.
2.6		2	6	COAL L. Fire clay.
50.0		?		
		35		Sandstone.
		15		Limestone.
2.6		2	6	COAL K. Fire clay.
50.0		?		
		50		Sandy shale.
.6			6	COAL I.

GENERAL SECTION—Continued.

SPACE.		Ft.	In.	
30.0		30		Sandstone.
1.0		1		COAL H.
		1		Fire clay.
91.0		90		Heavy bedded gray sandstone.
				Cannelton building stone.
1.6		1	6	COAL G. "Top Coal."
		4		Fire clay. Potters' clay.
44.0		40		Gray shale with ironstone.

GENERAL SECTION—Continued.

SPACE.		Ft.	In.	
4.0		4		COAL F. Main "Cannelton seam."
60.0		5		Fire clay.
		4		{ Thin bedded sandstone and Schisto- tose sandstone.
		15		Sandy shale.
1.0		1		COAL D?
84.0		4		Fire clay.
		5		Shaly sandstone.
		45		Thick bedded sandstone. Lower building stone.
		30		Sandy shale.
.6			6	COAL B.
		1		Fire clay.

GENERAL SECTION—Continued.

SPACE.		Ft.	In.	
50.0		50 to 70		{ Conglomerate massive sandstone with pebbles.
2.6		2	6	COAL A.
		2		Fire clay.
		50 to 90		Sandy shale and massive sandstone.
			/	
		80		{ Greenish marly shales alternating with pentramital and Archime- des limestone.
205.2				

GENERAL SECTION—Continued.

SPACH.		Ft.	In.	
		70		Gray Archimedes limestone.
		5	2	Bituminous shale.
.2			2	Coal.
		20		Sandstone.
100.0		20		Gray limestone.
				Ohio river at Rome.
233.2	Total.			

*St. Louis Limestone.* The gray limestone at the base of the above column is the equivalent of the sub-carboniferous member designated in the Missouri and Illinois Geological Reports, as the St. Louis limestone. At St. Louis it contains a number of beautiful and interesting fossils, among which are *Palæchinus multipora*.

This limestone may be seen along the banks of the Ohio river and in the valley over a greater part of the county east of Deer creek. The prevailing color is light gray with occasional layers of fine grained lithographic stone; but the latter generally contains too many crystals of calcite to be made available for lithographic purposes. So far as my examination went, this member contains but few fossils.

There are various reports of lead being found in this limestone on Poison creek and it is possible that it may contain isolated small pieces of galena; but no true veins of galena are likely to be found in this county.

Every county, where hills and rocks prevail, has its Indian tradition relating to the existence of rich mines of lead and precious metals. When engaged on the survey in Kentucky, I remember hearing the story of "Swift's Silver Mine" and its location from what was considered indisputable evidence in every county in the State from the Ohio river on the west, to the Big Sandy river on the east, and it is possible that I might have followed the tradition into Virginia. Thus the poor lazy Indians who never worked mines or engaged in the smelting of ores in all their lives, are the will-o'-the-wisps which credulity have conjured up to lead even some of the best informed citizens to search after imaginary mines where enough silver may be had to shoe all the horses in the country, or where lead ore exists without limit. Indeed, it would be difficult to estimate the amount of money and valuable time spent in these fruitless searches. It becomes, therefore, one of the important duties of the geologist to disabuse the public mind regarding the faith to be placed in these traditional mines, as the knowledge of what minerals are not to be found, puts a stop to misdirected capital and enterprise. It is well to bear in

mind that it is hazardous enough to work mines when a portion of the mineral is all the time in view.

The lower carboniferous rocks are metaliferous in many parts of the world, but most generally in localities where metamorphism has played a prominent part and crystalline rocks prevail. The gold bearing quartz veins of the Placer mountain in New Mexico, traverse rocks of this age and pass upward into quartzite sandstone which is referable, in my opinion to the carboniferous. So, at the Organ mountains in the southern part of the territory near Las Cruces, the silver ore is found in veins cutting through the sub-carboniferous limestone which is here crystalline and capped with porphyry. The latter rises up in great columns resembling organ pipes, and hence the name of the mountain.

In Crittenden and Livingston counties, Kentucky, and in Hardin county, Illinois, there are in the St. Louis limestone broad veins of fluor spar, containing more or less lead. These veins are very promising and a great deal of money has been spent in their development, but, so far as I can learn, without a compensating return. It is true, that furnaces have been built and considerable lead ore mined and smelted into pigs in Illinois, but this fact does not settle the question of profit. This member is also the repository in Kentucky and in Hardin county, Illinois, of hydrated oxide of iron, in large beds or pockets.

Above the St. Louis limestone is an intercalated sandstone, on which rests the Archimedes limestone of the Illinois Reports, alternating with greenish marly shales. In places the limestone is quite rich in characteristic fossils, *Archimedes*, *Pentramites*, etc.

In the associated shales are occasional thin bands of clay ironstone. A seam of coal from one to six inches thick, is also found in this member in connection with a seam of bituminous shale; it is not continuous, but may be seen locally, from Leavenworth, in Crawford county, to Deer creek. Near Rome and at other points, much time has been lost and money spent in digging into this black shale with



the hope that the coal would prove to be thick enough to mine when followed a considerable distance into the hill. I have never found or heard of a seam of coal, below seam A of the above column, that was over six to eight inches thick, and as a rule, when a seam has acquired a roof of solid slate or other rock, the thickness is just as likely to diminish as increase by pursuing it to a greater distance from the outcrop.

Above the Archimedes limestone is a massive sandstone attaining in some places, including the sandy shales and flags, a total thickness of one hundred feet or more. A portion of this sandstone member, is in a solid bed forty to sixty feet thick without seams; but occasionally you find the exposed face roughened by lines of false bedding and irregular markings of oxide of iron which stand out in bold relief from the weathered surface. The Hon. James Hardin, whose hospitality I enjoyed while in this portion of the county, very kindly drove me in his buggy to a locality near Rome where this sandstone is seen in great force, and I obtained there the following section, the measurements of which were taken with the aneroid barometer.

Section of the rocks at Cedar Lick Hollow, one and a half miles northwest of the residence of Hon. James Hardin, on section 6, township 7 south, range 1 west:

CEDAR LICK HOLLOW.

SPACE.		Ft.	In.		
94.		4.		Soil and covered.	Chester sandstone.
		60.		Brown colored massive sandstone.	
		80		Shaly sandstone.	
170.		80		Greenish marly shale and Pentramital limestone.	Upper Archimedes limestone.
		70.		Gray Archimedes limestone.	

## CEDAR LICK HOLLOW.—Continued.

SPACE.		Ft.	In.	
		20.		Buff sandstone. { Upper Archi- medes lime- stone.
80		40.		Gray limestone. {
				St. Louis lime- stone.
		40.		Covered to high wa- ter of Ohio river. }
344	Total.			

This section extends from the high water mark of the Ohio river to the top of the ridge, and represents 340 feet of lower carboniferous strata, and, including a portion of the St. Louis limestone group, all of the upper Archimedes limestone and the greater part of what is called in the Illinois Reports, the Chester sandstone group.

The topography of the country where this succession of strata prevails, is characterized by rugged hills and long narrow ridges that are lined on one or both sides, near the top, with cliffs of massive sandstone; and scattered over the precipitous escarpments to the valley below, are immense quadrangular blocks of sandstone that have broken loose and fallen from the parent bed above. One of these blocks measures 120 by 80 feet and is estimated to be 50 feet high. Several large cedar trees are growing on the top of it. The washing away of the shales and the destruction of the lower part of the sandstone cliff by weathering has produced large

cavities; the so-called "Rock Houses." In one of these "rock houses" I saw several Indian graves that were walled with stone. They are about four feet long and two feet wide. From time to time they have been dug into, and it is said that a few arrow heads and stone axes have been taken out. A quantity of flint flakes and a few fragments of human bones were seen in the dirt. I believe that a careful search in the bottom of this cave will bring to light, not only relics and human bones, but also the bones of quadrupeds and other animals, some of which may prove to be new to science. In a large sandstone rock which had fallen from above and which lies near the mouth of the cave but entirely beyond the roof, there are two ovoid holes about two feet apart. Their largest diameter at the mouth is eight inches, shortest diameter six and a half inches, depth twenty-two inches, width at bottom about three inches. The top of the rock, on the upper side, is about two and a half feet above the ground. The direction of these holes is vertical, but, from the position of the rock, they run diagonally across the lines of bedding. At a rock house in the conglomerate sandstone, in another part of the county, I saw similar holes but paid little attention to them, supposing them to be "pot holes," that is holes formed by the abrading action of pebbles kept in motion by the action of running water. But here the position of the rock and all the surroundings precluded the possibility of their having been produced by such agencies, and these holes must be looked upon as the work of Indians; most likely of the "Mound Builders." To what uses they were put is a matter of conjecture, but it is most probable that they served as mortars in which to crush acorns and roots for food. The long pestle-shaped stones, which are not uncommon relics of the Mound Builders, would find in these holes a mortar suited to their length. Their great depth may result, in part at least, from the gradual wearing away of the sandstone by the act of pounding with a pestle made of much harder stone.\*

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\*The long cylindrical stones called pestles or hammer stones are usually of trap or greenstone and are very hard.

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This sandstone is also seen at the base of the hills and exposed in the bank of the Ohio river, just above Rock Island. In places it is suitable for building stone and may be quarried in blocks of any required size.

*Millstone Grit or Conglomerate.*—These terms are applied indiscriminately to a massive sandstone that is often charged with quartz pebbles, and lies at the base of the coal measures. The millstone grit is seen over the greater part of Perry county and is here represented by sandy shales, flags, and a massive sandstone containing quartz pebbles.

In many parts of the county, coal seam A, which underlies this conglomerate sandstone, is from two to two and a half feet thick and the quality is good. At Rock Island, just above Cannelton, it is entirely absent or is only represented by a few inches of coal as may be seen by the following section, given by Joseph Lesley, Jr., in the report made by the former State Geologist, Professor Richard Owen, (1859. pp. 343, 344):

# SECTION OF THE ROCKS NEAR THE MOUTH OF DEAR CREEK.

SPACE.		FT.	IN.	
151.		77		Thin bedded sandstone.
		4		Ferruginous sandstone.
		70		Thick bedded sandstone. Building stone.
1.6		1	6	Top coal vein.
48.		48		{ Gray shales with thin bands of nodular iron ore.
4.		4		Main Cannelton coal.
		5		Fire clay.
58.		58		{ Shales and Schistose sandstone with heavy band of kidney iron ore.
1.1		1	1	Lower coal vein.
		4		Fire clay.
		10		Shales.

## SECTION OF THE ROCKS—Continued.

SPACE.		FT.	IN.	
30		40		Thick bedded sandstone.
		35		Thin bedded sandstone.
125				Coal streak.
		70		Massive sandstone & conglomerate.
		55		Probably sandstone.
				{ Top of Subcarboniferous lime- stone at mouth of Deer creek.
477.7	Total.			

Mr. Lesley made a topographical map of the country around Cannelton which was not published, and I presume it is lost, as I have not been able to find or learn anything of it. This is to be regretted, as the work of so able a topographer could not fail to be of practical as well as of scientific value.

The section given above shows at least 422 feet of coal measures and millstone grit, and in this depth we have represented by massive sandstones nearly the entire coal measures of the State, with only one workable seam of coal; the main Cannelton coal, which is referable to F of my classification. The sub-conglomerate coal A, is also wanting in this section, but shows in the cliff a short distance to the west, where it is only a few inches thick.

At Godfried Everard's on sections 10 and 11, township 5 south, range 2, one and a quarter miles southwest of Leopold, coal A is thirty inches thick and of very good quality. It has been mined on a small scale for smithing, and I was told that it answered the purpose very well. It has a glossy black color, but contains some seams of pyrites. The bituminous brown shales over the coal contain a variety of fossil plants, but in such a bad state of preservation that they would not bear handling. The principal kinds noticed are: *Lepidodendron* sp.?, *Neuropteris Loschii*, *N. hirsuta*, *Sigillaria* sp.?, and some stems of plants.



The section from the top of the hill to the coal is :

SPACE.		Ft.	In.	
101.0		30		Covered.
		70		Flags and massive conglomerate sandstone with pebbles.
		1		Bituminous brown shales.
2.6		2	6	COAL A.
		1		Fire clay.
317.0		30?		Covered space to the foot of ravine.
		?		Sub-carboniferous limestone.
134.6	Total.			

A weathered specimen of coal obtained from the mouth of the mine gave, on analysis :

EVERARD'S COAL A.

Coke, - - 55.50	{	Ash, red, - - -	1.50
		Fixed carbon, - - -	54.00
Volatile matter, 44.50	{	Water, - - -	7.50
		Gas, - - - - -	37.00
<hr/>			<hr/>
100.00			100.00

Coke puffed, amorphous with metallic lustre.

At Mrs. Foster's on section 11, same town and range as above, we have the same succession of strata, and coal A outcrops under a heavy cliff of conglomerate sandstone which appears on all sides of a deep ravine. This cliff contains a number of caves, "rock houses," which are similar in appearance to those seen near Rome. At the mouth, they are from three to ten feet high and the roof slopes back until it reaches the floor. The depth seldom reaches twenty feet. Here one is called the Saltpeter cave, and it is said that nitre has been extracted from the dirt which exists in limited quantity on the bottom; another is called the Indian Mortar cave. Within the mouth of this cave is a large stone that has fallen from the roof in which there is a number of round holes about six inches in diameter, one to two feet deep and tapering down to their bottom. At that time I could not conceive of any use to which such narrow deep holes could be put, and notwithstanding the careful memorandum then made that the rock containing them was situated too far within the rock house for dropping water to reach it, and that there was no evidence showing that any body of water had ever issued from the cave, still I was loth to believe them artificial and left the spot fully persuaded that they were produced in some unaccountable way by the action of water. But I have now not the slightest doubt that they are the work of the Aborigines. I picked up a flint arrow-head at the mouth of this rock house, and it is possible that many interesting relics and bones of animals could be found by digging up the bottom. In a field belonging to Mr. Peter Fealy, which is on the ridge near by, flint flakes are to be seen in great abundance, and Mr. Fealy says he finds numbers of flint spear heads, arrow heads and stone axes every spring when he plows the field. Indeed there is no want of evidence to show that the rock houses formed the abode of Indians, but whether Mound Builders or more recent races, or both, is a question which can only be satisfactorily answered by more extended researches.

The massive conglomerate sandstone in which the rock houses occur, contains a few pebbles, and the exposed face is

in many places at least forty feet thick and without a seam. The coal which lies below it, though too thin to be of commercial value, is found in most of the hills bordering on Deer creek and Little Deer creek, and on the headwaters of Anderson, and the Middle and Sulphur Forks of Anderson creek. The sub-carboniferous limestone is exposed in many of the ravines below it.

At Mr. Abraham Lusher's, on section 7, town 4, range 2, the sub-carboniferous limestone outcrops at the base of the hill, and coal A is about thirty feet above it. It has been dug into by Mr. Lusher, and it is said to be two feet thick. The opening which had been made was filled up with washings from above, and I was unable to find any good specimens for analysis in the debris.

In the shales under the coal seam there are bands of good ironstone, but the extent of this ore could not be ascertained. The pieces picked up were three to four inches thick.

The following is a section of the rocks taken from the creek at Mr. Lusher's house to the top of the ridge:

SPACE.		FT.	IN.	
200.		200		{ Covered space, mostly sandstone and shales.
?		?		COAL B. Thin.
40		40		Massive sandstone.
2		2.?		COAL A.
		1		Fire clay.
		30		Gray shales.
71		40		Archimedes limestone. Sulphur Fork.
213.	Total.			

This coal has also been dug into at the following places:

Cutter tract, section 20, township 4, range 2.

Wm. Lanman's, section 31, township 4, range 2.

Holman, section 33, township 4, range 2.

A. Lusher's, section 27, township 4, range 2.

Flamin's, section 20, township 3, range 2.

Sproule & Bugger's, section 21, township 3, range 2.

Unknown, section 2, township 4, range 2.

Platts', section 24, township 3, range 3.

Mrs. Baird's, section 12, township 4, range 3.

J. Lazenby, section 29, township 5, range 2.

F. Mack, section 26, township 5, range 2.

J. Pollock, section 26, township 6, range 2.

J. C. Shoemaker, section 22, township 4, range 2.

At Leopold, near the base of the conglomerate, on land belonging to Henry Deville, sections 1 and 2, township 5, range 2, and on John Morgan's land, section 12, township 5, range 2, there are deposits of hydrated oxide of iron which cover a considerable area on the sides of the hills, and it has been proved, by shafts sunk into the beds, to be more than five feet in depth. I have not yet had the time to make an analysis of this ore, and, therefore, quote the one made by Prof. Richard Owen.\*

Water,	-	-	-	-	-	-	8.0
Insoluble silicates,	-	-	-	-	-	-	16.0
Sesquioxide of iron,	-	-	-	-	-	-	69.5
Protoxide of iron,	-	-	-	-	-	-	trace.
Alumina,	-	-	-	-	-	-	3.0
Lime,	-	-	-	-	-	-	trace.
Magnesia, alkalies, and loss,	-	-	-	-	-	-	3.5
							100.0

From this analysis it will be seen that the ore contains 48.6 per cent. of iron, and 16. per cent. of silica. The experiment of smelting similar ores is about to be made by the blast furnace which has just been completed near Shoals, in Martin county, Indiana; and should it prove successful—and I have not the least doubt but that it will, especially if the native ore is mixed with a portion of the specular ores of Missouri—then there is no reason why this ore at Leopold should not be sought after, and blast furnaces be erected at the coal mines on the Ohio river for smelting it. This ore is not only found in the hills about Leopold, but may be seen at many other places in the county, some of which are indicated on the map which accompanies this report.

The conglomerate sandstone member will, in places, furnish good building stone. The Catholic church at Leopold, which is quite a handsome edifice, is built of stone from this series, and it gives promise of durability.

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\*Geological Reconnaissance of Indiana, 1859, page 183.

We may, then, in Perry county, enumerate as the economical minerals of this epoch—coal, iron ore, and building stone.

*Coal Measures:* In Perry county the rocks of this epoch are mostly massive sandstone, with a paucity of stonecoal and argillaceous shale, and they represent by far the greater portion of the entire measures of the State. The following section will represent the character of the rocks, and show the true place occupied by the "Main Cannelton Seam."

Section of the coal measures of Perry county, including the millstone grit, made from outcrops on the Ohio river between Rock Island and the mouth of Anderson creek:

SPACE.		FT.	IN.	
57		30		Covered space.
		12		Sandy shale.
		15		Limestone.
2.8		2	8	COAL K with six in. fire clay.
		2		Fire clay.
50.		48		Sandy shale.
.8			8	COAL I.
				Fire clay ?
30.		30		Sandstone.
1.		1		COAL H and fire clay.

SECTION OF COAL MEASURES—Continued.

SPACE.		Ft.	In.	
99.		99		{ Shay sandstone and massive sandstone. Building stone.
1.6		1	6	COAL G. "Top coal."
		4		Fire clay used for pottery.
40.		26		Shale.
		6		COAL F. Fire clay.
51.		33		Shales and sandstone.
1.		1		COAL D?
		4		Fire clay.
		10		Shales.

## SECTION OF COAL MEASURES—Continued.

SPACE.		Ft.	In.	
89.		40		Massive sandstone. Building stone.
		35		Thin bedded sandstone.
.6		0	6	COAL B. Fire clay.
		1		
71.	/	70		{ Conglomerate sandstone with pebbles.
2.6		2	6	COAL A. Fire clay.
2		2		
496.10	Total.			{ Sandy shales belonging to the lower carboniferous.

It will be seen in the above column of the coal measures, that I give to the "Main Cannelton Coal," a position in the series which corresponds to that of the third block coal seam (F) at Brazil, in Clay county. It is 148 feet above the conglomerate sandstone at Cannelton, and there are two seams—B and D?—in the intervening space. The latter



seams are not known to be workable in this county, and the upper has been referred to D with some doubt, as there is, here, no evidence by which its equivalency can be determined, except that of the space between it and B (90 feet), which is sufficiently great to warrant the assumption that in it, a seam of coal may occur at some locality.

Mr. Joseph Lesley, Jr., determined the general dip of the strata at Cannelton with great care. He says:\*

“5th. That the general dip of the strata is, as shown upon the accompanying map,† N.  $76\frac{1}{4}^{\circ}$  W., its average fall being 33 feet to the mile.

“6th. That this dip is not regular, but in long low waves. These waves cause the leading peculiarity of this portion of the coal field, and also have been the cause of much perplexity and pecuniary loss to those who have undertaken to develop the resources of this district, for the main coal vein has always been found to become thin, and sometimes even to disappear upon the crest of these waves, thus reducing very much the area of the workable coal, and throwing it, so to speak, into pockets which are difficult to strike without a previous careful geological and topographical survey; the eye of the practical miner, even trained as it may be, not being so certain to detect these disturbances as a careful examination by compass and level.

“In the tunnel north of Cannelton, this thinning out of the coal vein can be plainly followed. A shaving off of the coal vein would express this better, \* \* \* The whole four feet of coal, with its sulphur band, not being compressed into a streak only, but just the upper bench of coal disappears, then the sulphur band, and finally the lower bench of coal. \* \* \* \*

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\*Geological Reconnaissance of Indiana, by Prof. Richard Owen, State Geologist, p. 345.

†As no provision was made by the State to have this valuable topographical map published with the Report, the former State Geologist had it framed and hung up in the Geological Room. During the late war this room was used for other purposes, and the collection was boxed up and carried to the cellar, and in this way the map was lost.

"The strata decrease in thickness westward, even to entire absence, as in the coal of the shales overlying the main coal in the tunnel, where these measures are forty-six feet in thickness, whilst at the old Fulton banks, two miles to the westward, they have entirely disappeared, the roof of the coal being formed of the so-called 'Top Rock' mentioned in the section above. \* \* \* \*

"Besides these waves there is a fault running along the south side of Caney Fork of Deer Creek, and in a direction parallel to that of the general dip of the strata. At right angles to the fault, and running into it, is another, not so long, and showing itself on the east side of the valley of 'Hayden Meadow.' These faults are occasioned by an up-throw of the strata of the subcarboniferous limestone, which along Caney Fork form the bluffs along that stream and dip into the hills at an angle of  $60^{\circ}$  in a S. S. W. direction."

I am inclined to think that the appearance of the subcarboniferous limestone on Caney Fork is attributable to a strong wave in the strata, rather than to a fault. For here we have almost, if not quite, lost the whole of the sandstone member, which at the mouth of Deer Creek lies between the subcarboniferous limestone and the conglomerate, and which is, in places at least, one hundred feet thick. The cutting action, referred to by Mr. Lesley, must have, therefore, had full play here, previous to the deposition of the millstone grit.

At Rock Island mine, two and a half miles northeast of Cannelton, coal F is 147 feet above high water. Back of the Catholic church, at Cannelton, it is 80 feet, and at Fulton it is just at high water mark. At Tell City it is just below the bed of the Ohio river, and at the old pottery it has been reached by a shaft at a depth of forty feet below high water mark. On the opposite side of the river at the Reverdy mine, about half a mile above Hawsville, it is 185 feet above high water; at the Trabue mine, one-third of a mile below, it is 80 feet; at Hawsville 15 feet above, and at Haws' mine, one mile below town, it is 70 feet below high water. The difference of 65 feet in the level of coal F at Trabue's

mine and the mine a few yards from it, in the east edge of Hawsville, and the difference of 70 feet between the mine in the west edge of town and Haws' mine, one mile below town, has generally been considered due to faults. But, here again, I must attribute these differences in level to the waves of the strata which Mr. Lesley speaks of, for no evidence of a break or the sliding of one stratum past another could be seen. My examinations, however, have not been as thorough as they should be, to fully settle this point, which was due partly to the fact that, on both occasions when I visited Perry county, I was in poor health and suffered, most of the time, from a slight fever; and I can not too fully express my obligations to Hon. Hamilton Smith and his accomplished wife for the attention received from them.

In 1856, while engaged on the Geological Survey of Kentucky, under the direction of the late Dr. D. D. Owen, I accompanied Prof. Leo Lesquereux on a trip through a portion of the coal field in western Kentucky, and I well remember our surprise on finding at Haws' mine near Hawsville, the whole of the coal measure strata from the "Anvil Rock" sandstone to the Conglomerate sandstone. The main Cannelton coal, F, is just below the level of the bed of the Ohio river at Haws' mine, now abandoned; as it is said that, in driving an entry in the direction of the river the water broke into the mine in such quantities as to prevent its being worked. The "head works" have been destroyed, the railroad track, to the river, has been taken up, and nothing remains now to mark the place of the mine, except the slope which is nearly filled with water. Everything, indeed, was so completely changed that great difficulty was experienced in finding the old land marks; but being aided in the search by Mr. Bunce, Superintendent of the Hancock mines, and Mr. Evans, mining engineer of the American Cannel Coal Company, we finally succeeded in finding the out-crop of the limestone coal K; and the other thin seams which lie above F, and in fact, to verify the section which was made here many years ago by Prof.

Lesquereux and myself. This section is here given for the sake of comparison with those seen in Perry county.

SECTION AT HAWS' MINE, KY.

SPACE.		FR.	IN.	
		?		Slope. Sandstone, "Anvil rock"?  Sandy shale.
		6		Limestone.
2.6		2	6	{ COAL K with 12 inches of fire clay parting.
60		60		Sandstone and shale.
				COAL I.
30		30		Sandstone and shale.
1.6		1	6	COAL H.
30.		30		Sandstone.

## SECTION AT HAWS' MINE—Continued.

SPACE.		FT.	IN.	
1		1		COAL G.
40		25		Hard bluish shale.
		15		Black bituminous shale.
4		4		COAL F. "Haws' coal."
				Fire clay.
219.	Total.			

The coal seam, four feet thick, at St. Meinrad's in the northern edge of Spencer County, is referable to F, and though not nearly so thick, this seam may be traced by numerous outcrops along Anderson Creek to Troy, where it is forty feet below high water mark, and has been reached by a shaft.

On Windy Creek, between Tell City and Troy, coal F is thirty inches thick, and it is mined by adits and by striping at a number of places, and the coal is wagoned to market. But by far the most extensive mining operations in this county are carried on by the American Cannel Coal Company at Cannelton and at Rock Island mines, two and a half miles above. The seam here ranges from three to four and a half feet in thickness. They employ about 150 men and mine about eight thousand bushels of coal per day. Six banks are worked at Cannelton, three of which are reached by railroads leading to the river, and from the other three the coal is hauled in wagons.

The American Cannel Coal Company also owns the Hancock mines in Kentucky, four miles above Hawsville. All these mines are worked by adit levels, and the coal sold to steamboats is run to the river and dumped into barges. At

the Hancock mines, which are two miles from the river, a small locomotive is used to draw the coal. At Rock Island, the grade of the road to the river is such that the cars are run down by their own gravity, and the mules ride on a platform attached behind the car and draw the empty train back to the mine.

Clark Bros. lease their mines of the American Cannel Coal Company, and consume in their manufacturing operations about all the coal that is mined.

The Tell City Company have mines on their own property, from which they obtain a portion of the coal consumed in their extensive manufacturing establishments.

Mr. George Minto, a very intelligent mining engineer, who spent a great many years in the employ of Mr. Smith, and superintended the opening of most of the mines at Cannelton, sunk a shaft near the Old Pottery at the upper end of Troy, and at the depth of forty feet below the high water mark of the Ohio River, reached the Cannelton seam. Headworks were erected and mining operations commenced, but I was told that the mine could not be made to pay and it was finally abandoned. The shaft is now full of water, which precluded the possibility of seeing the coal ; but I was informed that the seam was about three feet thick.

A most interesting section was obtained at this place, extending from the coal at the bottom of the Minto shaft to the top of a big hill just back of it. This shaft, it will be seen by reference to the map, is in the direction of the strike of the strata from Haw's mine, one mile below Hawsville, in Kentucky, and very nearly on the general strike of the strata as determined by Mr. Joseph Leslie's survey. And the sections at each place correspond as nearly as could be expected from measurements made with an aneroid barometer.

SECTION AT MINTO'S SHAFT.

SPACE.		Ft.	In.	
57.		5		Soil and clay.
		10		Loess ?
		27		Covered and shale.
		15		Arenaceous limestone. Limestone.
1		1		COAL K.
50.		?		Fire clay.
		50		Sandy shale.
?				COAL I, thin.
		?		Fire clay.
		30		{ Sandy shale and heavy bedded sandstone.
2.		2		COAL H and fire clay.
		90		{ Schistose, massive and shaly sandstone.

## SECTION AT MINTO'S SHAFT—Continued.

SPACE.		FT.	IN.	
90				
1.6		1	6	COAL G. "Top coal."
		5		Fire clay used at potteries.
		10		Shale.
45.		30		Sandstone.
3		3		COAL F. Cannelton seam.
4		4		Fire clay.
				Low water in Ohio river.
283.6	Total.			

Corresponding sections may be seen in the hills on Windy Creek, northwest corner of section 20, township 6, range 3, and in a high hill just west of Cannelton. On Windy Creek, the limestone coal K, was at one time opened, and I learned from Mr. George Minto, Jr., that it was, here, a double seam:



## SECTION ON WINDY CREEK.

SPACE.		FT.	IN.	
2.10			8	COAL.
			6	Fire clay.
		1	8	COAL.
		?		Fire clay.
	Total.			

From the sections already given, it will readily be seen that the limestone and coal K, about 210 feet above the main Cannelton coal F, furnishes as sure a guide to the place of the latter as the pebbly sandstone which is below it.

Two miles below Troy, at the "Mound" hill, in Spencer county, and on land owned by Dr. Gage, there are three seams of coal between low water and the top of the hill. These seams were all opened by John Stephens, of Rockport, and his brother A. Stephens. Commencing at low water, Mr. John Stevens put a bore down sixty feet to a seam of coal two and a-half feet thick, which is about the place of the Cannelton seam. Mr. Stephens made the space here, 181 feet between this seam and the limestone coal. I visited the locality with Mr. George Minto, and his son, and found the old openings had filled up. We saw plenty of large fragments of limestone scattered over the slope of the hill, but were unable to make sure of its exact place. As nearly as we could judge, however, I made its place, with the aneroid barometer, 130 feet above low water, where Mr. Stephens commenced his bore. Now this limestone and the subordinate coals, may be followed very nearly to Judge Ingle's mines at the city of Evansville, in Vanderburg county, and is, therefore, a very reliable guide to the seams which lie above and below it. The greatest depth of strata from this limestone to the conglomerate sandstone in Perry county, does not exceed 390 feet, and a slight wave in the strata between Grand View, in Spencer county, and the mouth of Cypress creek, in Warrick county, has brought to

the surface the "Martha Washington" rock at Rockport, which in my last Report was, I still think, correctly referred to the conglomerate sandstone.

To make sure of this, we need only carry our observations a little farther to find the crop of subcarboniferous limestone, a few miles south of Owensboro, Kentucky.

In order more fully to show the connection of the coal seams in Perry county, with those at Newburg, in Warrick county, I will give a section of the rocks at the latter place, made from out-crops above, and from the shaft as far down as seam I, and from thence down, from the record of a bore made for oil by R. R. Roberts. This bore is at the mouth of Cypress creek, a short distance up the river from the Newburg shafts, and commenced in the fire-clay at the bottom of seam I.

#### SECTION AT NEWBURG.

SPACE.		FT.	IN.	
15.		15		Sandstone and shale.
2.6		2	6	COAL X.
		1		Fire clay.
		8		Limestone.
				Place of Coal K.
		22		Sandstone and shale.
				Place of coal.
81.		50		Shale and sandstone.

SECTION AT NEWBURG—Continued.

SPACE.		Fr.	In.	
5.		5		COAL I. Main Newburg seam.
124.		3	6	Fire clay.
		2		Slate.
		1	6	White sandstone.
		22		Dark sandstone.
		58		Dark shale.
		7		Dark sandstone.
		30		Light sandstone.
1.		1		COAL F.
		1		Fire clay.
		50		White sandstone.
		17		Black shale.

## SECTION AT NEWBURG—Continued.

SPAGE.		Fr.	In.	
172.6		5		Gray slate.
		5		Reddish slate.
		5		Hard red rock.
		87.		Gray slate.
		2	6	White sandstone.
401.	Total.			

This section stops at about the top of the millstone grit and shows a wonderful thinning out of the lower coal seams. Seam K is also absent, but there is a seam just above the limestone which is generally considered its equivalent. This is, however, in my opinion an error, as I have seen a coal seam above and another below the limestone of this horizon at quite a number of localities, and we have only to go a few miles south-west of Newberg, at the first locks on Green river, in Kentucky, to find this phenomena; and here the main Newberg seam, five feet thick, is also found

at about the same distance, eighty feet below the limestone. In consideration of these facts I have referred the coal above the limestone at Newberg to X, since it corresponds in position to that seam seen below Maysville on White river, in Daviess county.\*

Since writing the above I have been informed by Prof. Nutting that this coal has been found by a bore, between Washington and White river, in Daviess county, and is at this locality seven feet and ten inches thick. A company is now engaged in sinking a shaft for the purpose of mining it. Coal K is most generally a compound seam but when it attains too great a thickness, one and sometimes two subordinate seams unite with it, being separated merely by a parting of fire-clay.

By the aid of the section given above we may, with a considerable degree of certainty, correlate the coals of Indiana with those of Western Kentucky and Southern Illinois; and I shall venture to do so provisionally, commencing at the top with the sandstone, designated as the "Anvil Rock" sandstone in the Kentucky Reports. It can hardly be expected, however, from the nature of the basin in which the coals have been formed, that an equivalency can be established over so great an area, that will not require correction after more extended researches have been made. The coal strata do not, as was formerly supposed by many, spread over the entire field, but they lie rather in lenticular-shaped basins, formed either by an unequal resistance to elevating forces or by abrasions previous to the formation of the coal seams. We can not, therefore, determine over any very great area, the depth of which a shaft will have to be sunk in order to reach a given coal, by calculating the rate of its depression from the angle of its dip at the crop; nor can we expect to find the seam uniform in quality or thickness at all points.

Indeed, these are questions that require the most thorough research and study before they can be satisfactorily answered.

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\*See Geological Report of Indiana, 1870, page 34.

Section of coal seam in Kentucky from the "anvil rock" sandstone down to the conglomerate:

SPACR.		Ft.	In.	
25.		25		{ Sandstone; "Anvil Rock" of Ky. survey.
4		0 — 4		COAL X.
		0 — 2		Fire clay.
45.		0 — 25		Space.
		1 — 15		Limestone.
		1 — 3		Black bituminous shale.
10.		0 — 10		COAL K. (No. 11 of Ky. Rep.)
		8		Fire clay.
40.		37		Shale and sandstone.
2.6		0 — 2	6	COAL J.
		1		Fire clay.
61.		40 — 60		Shale and sandstone.
5.		0 — 5		COAL I. (No. 9 Ky. Rep.)
		4		Fire clay.
84.		40 — 80		Shale and sandstone.

SECTION OF COAL SEAM IN KENTUCKY—Continued.

SPAC.		Ft.	In.	
2.6		0 — 2	6	COAL H. Fire clay.
30		80—90		Sandstone and shale.
		0 — 3		COAL G. Fire clay.
		4		
44.		24—40		Shales and sandstone.
4.		4		COAL F. Fire clay.
		8		

SECTION OF COAL SEAM IN KENTUCKY—Continued.

SPACE.		Ft.	In.	
135.		60—130		Sandstone and shale.
4		2 — 4		COAL D. (Cassy's coal.)
		4		Fire clay.
134.		80—130		Sandstone.
.6			6	COAL B.
				Fire clay.
		70		Conglomerate sandstone.



## SECTION OF COAL SEAM IN KENTUCKY—Continued.

SPACE.		Fr.	In.	
70.				
2.6		0 — 2	6	COAL A. Fire clay.
763.	Total.			

According to the above section it will be seen that the Cannelton coal F corresponds in position more nearly to the four feet seam at Shotwell's mine, near Caseyville, than it does to Casey's coal on Tradewater river in Kentucky, with which it has generally been correlated.

The Cannelton seam of coal does not belong to that variety of bituminous coal known as *cannel*, though there is sometimes a thin layer of cannel coal found on top of the the seam. It is mainly a semi-caking coal and has a parting of sulphurous coal from a half inch to two inches thick and one foot from the top. The upper part has a dull vitreous lustre and breaks with a conchoidal fracture. The lower part is laminated and breaks into cubes. At the bottom of the mine there is from one to two and a half feet of slaty coal, and this rests on a thick bed of fireclay as shown in the section at page 93. The argillaceous shale forming the immediate roof of this seam contains a few stems of plants, and a fossil shell, *Lingula umbonata*.

An exhaustive analysis was made of coal from the different parts of the seam collected from the Rock Island mine, and the proximate analysis of samples from Clark's, Hick's and McMahon's mine, and also from the Hancock mines in Kentucky.

## Analysis of coal from

## ROCK ISLAND SEAM.

Upper twelve inches:

Coke, - - 54.50	{	Ash, white, - - -	2.00
		Fixed carbon, - - -	52.50
Volatile matter, 45.50	{	Water, - - -	4.50
		Gas, - - -	41.00
<hr/>			
100.00			100.00

Coke puffed, vitreous, amorphous. Semi-caking coal, and burns with a large flame.

Analysis of a specimen from the sulphurous coal parting:

Coke, - - 69.50	{	Ash, red, - - -	11.00
		Fixed carbon, - - -	58.00
Volatile matter, 30.50	{	Water, - - -	3.00
		Gas, - - -	27.50
<hr/>			
100.00			100.00

Coke not swollen, laminate, unchanged.

This parting contains a large portion of "clot," resembling mineral charcoal; it is a non-caking and free burning coal, and has disseminated through it small pieces of pyrites.

Lower part of seam:

Coke, - - 58.50	{	Ash, white, - - -	8.50
		Fixed carbon, - - -	50.00
Volatile mater, 41.50	{	Water, - - -	4.50
		Gas, - - -	37.00
<hr/>			
100.00			100.00

Coke much swollen, vitreous, amorphous. Caking coal, and burns with large flame.

Slaty coal at bottom of seam:

Coke, - - 62.00	{	Ash, lemon - - -	12.50
		Fixed carbon, - - -	49.50
Volatile matter, 38.00	{	Water, - - -	4.00
		Gas, - - -	34.00
<hr/>			
100.00			100.00

Coke swollen, laminate, vitreous. Though containing a large amount of ash it will make a very good fuel for some purposes.

Analysis of a specimen of the so-called cannel coal, part of the

## ROCK ISLAND SEAM :

Coke, - -	51.50	{	Ash, white, - -	6.00
		{	Fixed carbon, - -	45.50
Volatile matter,	48.50	{	Water, - - -	6.50
		{	Gas, - - -	42.00
	<u>100.00</u>			<u>100.00</u>

Coke slightly puffed, vitreous, laminate.

## CANNELTON MINE AT CANNELTON.

Upper part :

Coke, - -	55.50	{	Ash, white, - -	4.00
		{	Fixed carbon, - -	51.50
Volatile matter,	44.50	{	Water, - - -	3.50
		{	Gas, - - -	41.00
	<u>100.00</u>			<u>100.00</u>

Coke much swollen, amorphous, lustreless.

Middle part :

Coke, - -	50.50	{	Ash, brown, - -	2.00
		{	Fixed carbon, - -	48.50
Volatile matter,	49.50	{	Water, - - -	6.50
		{	Gas, - - -	43.00
	<u>100.00</u>			<u>100.00</u>

Coke puffed, laminate, vitreous.

Bottom part :

Coke, - -	49.00	{	Ash, red, - -	3.50
		{	Fixed carbon, - -	45.50
Volatile matter,	51.00	{	Water, - - -	5.00
		{	Gas, - - -	46.00
	<u>100.00</u>			<u>100.00</u>

Coke puffed, laminate, lustreless.

## CLARK BRO.'S MINES AT CANNELTON.

## Upper part:

Coke,	-	-	50.50	{	Ash, white,	-	-	-	2.00
				{	Fixed carbon,	-	-	-	48.50
Volatile matter,			49.50	{	Water,	-	-	-	7.00
				{	Gas,	-	-	-	42.50
<hr/>									
100.00									100.00

Coke puffed, amorphous, vitreous.

## Middle part:

Coke,	-	-	53.00	{	Ash, white,	-	-	-	3.50
				{	Fixed carbon,	-	-	-	49.50
Volatile matter,			47.00	{	Water,	-	-	-	6.50
				{	Gas,	-	-	-	40.50
<hr/>									
100.00									100.00

Coke puffed, laminate, vitreous.

## Bottom part:

Coke,	-	-	52.50	{	Ash, white,	-	-	-	4.00
				{	Fixed carbon,	-	-	-	48.50
Volatile matter,			47.50	{	Water,	-	-	-	6.50
				{	Gas,	-	-	-	41.00
<hr/>									
100.00									100.00

Coke not puffed, laminate, lustreless.

## HANCOCK MINES,

in Kentucky, three miles above Hamilton.

## Upper part:

Coke,	-	-	53.00	{	Ash, blue,	-	-	-	3.50
				{	Fixed carbon,	-	-	-	49.50
Volatile matter,			47 00	{	Water,	-	-	-	6.50
				{	Gas,	-	-	-	40.50
<hr/>									
100.00									100.00

Coke much puffed, amorphous, vitreous.

**Middle part:**

<b>Coke,</b>	-	49.50	{	Ash, brown,	-	-	4.00
			{	Fixed carbon,	-	-	45.50
<b>Volatile matter,</b>		50.50	{	Water,	-	-	5.50
			{	Gas,	-	-	45.00
		<hr/>					<hr/>
		100.00					100.00

Coke much puffed, vitreous, amorphous.

**Bottom part:**

<b>Coke,</b>	-	-	52.00	{	Ash, liver,	-	-	-	12.00
				{	Fixed carbon,	-	-	-	40.00
<b>Volatile matter,</b>			48.00	{	Water,	-	-	-	6.50
				{	Gas,	-	-	-	41.50
			<hr/>						<hr/>
			100.00						100.00

Coke vitreous, not puffed, laminate.

**Slaty coal beneath the seam:**

<b>Coke,</b>	-	-	60.50	{	Ash, white,	-	-	24.00
				{	Fixed carbon,	-	-	36.50
<b>Volatile matter,</b>			39.50	{	Water,	-	-	8.50
				{	Gas,	-	-	31.00
			<hr/>					<hr/>
			100.00					100.00

Coke slaty, laminate, unchanged.

**HECK'S COAL NEAR CANNELTON.****Top of seam:**

<b>Coke,</b>	-	-	55.50	{	Ash, blue,	-	-	-	6.00
					Fixed carbon,	-	-	-	49.50
<b>Volatile matter,</b>			44.50	{	Water,	-	-	-	4.50
					Gas,	-	-	-	40.00
			<hr/>						<hr/>
			100.00						100.00

Coke puffed, vitreous, amorphous.

Bottom part of seam :

Coke, - -	53.50	{	Ash, red,	-	-	8.50
			Fixed carbon,	-	-	45.00
Volatile matter,	46.50	{	Water,	-	-	3.50
			Gas,	-	-	43.00
			100.00			100.00

Coke puffed, laminate, lustreless.

#### MCMANON'S COAL.

Upper part :

Coke, - -	52.50	{	Ash, blue,	-	-	4.00
			Fixed carbon,	-	-	48.50
Volatile matter,	47.50	{	Water,	-	-	6.00
			Gas,	-	-	41.50
			100.00			100.00

Coke not swollen, lustreless, laminate.

Lower part :

Coke, - -	56.00	{	Ash, brown,	-	-	5.50
			Fixed carbon,	-	-	50.50
Volatile matter,	44.00	{	Water,	-	-	4.50
			Gas,	-	-	39.50
			100.00			100.00

Coke not swollen, lustreless, laminate.

An ultimate analysis was made of a specimen from the Rock Island coal taken from above the parting, and another, of a mixture of equal parts of Nos. 1, 2 and 3 of the proximate analysis :

	Ashes.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.
Upper part .....	2.	4.61	79.24	1.15	12.80
Mixture of Nos. 1, 2 and 3.....	9.5	4.45	75.40	.25	9.70

The theoretical calorific power of the coal from the upper part of this seam is:

$$.7924 \times 8080 = 6402.59 \text{ carbon calories.}$$

$$.0319 \times 34462 = 1110.33 \text{ hydrogen calories.}$$

$$6402.59 + 1110.33 = 7512.92 \text{ total heat units.}$$

The heat units of the coal being 7513, in round numbers, by dividing this by 100 the number of degrees between the freezing and the boiling point by Centigrade thermometer, we find 75.13 pounds as the quantity of water that a pound of coal will raise from the freezing to the boiling point, and by dividing the latter number by 5.5 we have 13.7 as the number of pounds of boiling water that one pound of coal will convert into steam.

From the elementary analysis of equal parts of the whole seam we find its calorific power in the same manner, thus:

$$7540 \times 8080 = 6092.32 \text{ carbon heat units.}$$

Available hydrogen, after deducting .0108, the amount combined with the oxygen as water:

$$.0337 \times 34462 = 1161.36 \text{ hydrogen heat units.}$$

$$6092.32 + 1161.36 = 7253.68 \text{ coal heat units.}$$

One pound of mixed coal will raise 72.53 pounds of water from freezing to the boiling point, or will convert 13. pounds of water from the boiling point into steam.

The late Professor Walter R. Johnson was employed by the United States Government to test the relative calorific value of a number of coals, both of this country and of Enrope, and among them the Cannelton coal. These tests, also, go to show that it has a high calorific power. The Cannelton coal is used in the manufacture of gas for lighting the cotton mill, but no account is kept of the quantity of gas made from a given quantity of coal; and I was, therefore, unable from this source to ascertain its yield. The quality of the gas, judged merely by the eye, on seeing it burn at the factory, is very good, and no great trouble is experienced in its manufacture.

Samples from the upper, middle and lower parts of the seam, and from the slaty coal, and a mixture of equal parts of all were tested in the laboratory for illuminating gas, and the result is given in the following table:

ROCK ISLAND COAL. PERRY COUNTY, INDIANA.	Coke.	Tar and Ammoni- cal liquor.	Water.	Carbonic Acid and Sulph. Hyd.	Illuminating Gas by difference.	Cubic feet of Gas per lb. of Coal.
No. 1. Top of Seam .....	62.5	15.00	.25	.50	21.75	3.41
No. 2. Middle exclusive of the sulphurous band of seam.....	72.5	2.50	.....	.25	24.75	3.60
No. 3. Bottom of seam.....	62.5	15.00	.....	.....	22.50	3.68
No. 1, 2, 3. Average of seam.....	62.0	12.50	.25	.50	24.75	3.18
No. 4. Coal Rash, below bottom of seam .....	62.5	.....	5.00	.....	32.50	3.41

It will be borne in mind that the Youghiogheny coal analyzed for comparison gave 4.05 cubic feet of gas to the pound of coal, whereas, in practice at the Indianapolis Gas Works they obtain 4.34 cubic feet on an average; the ratio is as one to 1.07; calculated by this ratio the average of the seam, without the shaly coal at the bottom, will at the Gas Works, give 3.40 cubic feet of gas per pound of coal, or a short ton will yield 6800 cubic feet of illuminating gas. By selecting the best parts of the seam for gas the yield would be 3.74 cubic feet per pound or 7480 cubic feet from a ton of 2000 pounds.

The coal rash, or shaly coal, at the bottom of the seam will yield at the gas works 3.65 cubic feet to the pound, or 7200 cubic feet to the ton. This material, therefore, which is now thrown away as worthless, or left in the mine, is rich in gas, and from the low price at which it may be had, can be brought into competition with some of the coals which, though they yield more gas and a valuable coke, are much higher priced.

Some parts of the Cannelton seam will make an excellent coke. The value of the coke, from the average of the two



best portions of the seam for gas, as compared to the Youghiogeny coal, taking the latter as 100, will be—average coke from upper and middle parts of the seam, exclusive of the sulphurous parting; Coke 67.5—Ash 6.0=61.5 solid carbon. Solid carbon in the Youghiogeny 67.00; ratio of value 100 to 92.

In the Indiana Agricultural Report dated 1856, but not published until 1857, there is a communication bearing the latter date, from the pen of Hon. Hamilton Smith, giving a detailed and highly interesting account of the mining and cotton manufacturing interests of Cannelton at that time. Believing that it would be well to republish a portion of this communication, and on mentioning the subject to Mr. Smith, he very kindly gave me permission to publish such parts as I desired, and also to use the wood cuts which were formerly employed to illustrate it:

“The Company which I represent are now acting under the first charter granted by the Legislature of Indiana for the mining of coals. This was obtained in the year 1837, by a few New England capitalists, who immediately commenced operations under its very liberal provisions. With every promise of brilliant success, they expended a large amount of money in lands, (then perfectly wild,) buildings, drifts, shafts, boats, engineering, etc., and, when they were ready to deliver coals to the passing steamboats, they ascertained, to their cost, that the steamboat engineers were of opinion that such fuel would not make steam. After eight years of exertion, the Company were unable to extend their sales over two hundred thousand bushels a year, although they had the only coal mines opened below the Falls of the Ohio. Now, one of our packets requires a larger supply.

“The early efforts to introduce the use of these coals to markets below us, on the Ohio and Mississippi rivers, were attended with uninterrupted loss. Instead of dividends, the stockholders were subject to yearly assessments. The necessary expenditures exceeded all estimates, and no amount of capital seemed sufficient to establish the Company on a firm basis, and to make its stock yield an annual income.

After the operations of nearly twenty years, and an investment of something over six hundred thousand dollars, reckoning interest at six per cent., we are now just beginning to make both ends meet, and to rely with reasonable certainty on satisfactory dividends in the future. In the last few years our coal lessees have made very respectable profits on their business. There was no necessity for their purchase of more lands; they had no improvements to make, no railroads to build, no experiments to try, and no heavy taxes to pay on unproductive property."

\* \* \* \* \*

"The value of our coals depends, of course, on their extent, accessibility and relative qualities. Reference has already been made to the difficulty of determining the first point from the few isolated facts already known. It is equally difficult now to determine the latter point. To be sure, many specimens from different localities have already been analyzed, and we can form an estimate of the character of the seams with somewhat more correctness than we could the character of a house from a specimen brick.

"Our Cannelton seam very closely resembles the 'Sheffield seam' in England, and near the city of Sheffield. That is separated in working into six varieties and for different uses. A portion of this seam produces a coking coal of great richness, and particularly valuable for metallurgical purposes. Other portions are very open burning, and are utterly unsuitable for even the ordinary uses of the blacksmith. The analysis of a specimen from either portion would give a very incorrect idea of the whole vein.

"The most extensive series of experiments ever made on American coals, were made by Professor W. R. Johnson, and his report to the United States Senate, for a time, fixed their relative values in public opinion. Unfortunately for us there was but one specimen sent to him from the Illinois coal measures, and that was a section of our Cannelton seam, including the top coal and parting sulphur band, which we never bring out of our mines. Of course the results did not fairly indicate the quality of our coals.

Under the disadvantageous trial, however, they proved equal to the best English varieties and, in some important qualities, were placed above the coals of Pennsylvania."

\* \* \* \* \*

"The demand for our coal is increasing with great rapidity, and this year it is very far beyond our means of supply. When the changes are made below the falls of the Ohio, in the means of transit, that have already taken place above the falls; that is, when the steam tug and barges are substituted for the unwieldy flat boat, the coal depots from Cairo to the Balize will demand from us a very large quantity—perhaps twenty-five million of bushels a year—while the river cities and towns and sugar mills on the 'coast' may call for an equal quantity. It is quite possible that the time is not very distant when coals will be the largest item in our list of exports.

\* \* \* \* \*

"We consider twelve bushels of our coals, properly used, as equivalent to a cord of the best beech wood for making steam, and ten bushels as good as a cord of ordinary cotton wood. The first is becoming more and more scarce on the banks of the Ohio, and its value increases in the same proportion, and either from the scarcity or other causes, the price of cottonwood on the Mississippi river seems to be steadily increasing. It now averages nearly or quite three dollars per cord between Cairo and New Orleans. This is equal to thirty cents per bushel for the coal, which, when we get fairly into the business and manage it with system and economy, we shall be able to supply, at less than an average of fifteen cents the bushel; and, besides, the mineral fuel requires less labor, is less dangerous, takes up less room, calls for fewer stoppages of the boat, and makes steam with more regularity than wood. Already the insurance offices are making a difference in their rates in favor of the boats using coal. As I write, the steamer Eclipse is lying before my door and taking on coal for her downward trip—over 9,000 bushels. This will about run her to New Orleans, and the saving in her fuel bill will

amount at least to \$1,250. The steamboats on the eastern waters commenced the use of coals about 1834. Now no other fuel is used by them, and such has been the diminution of their running expenses that their rates of passage and freight have been materially reduced, while the profits of running, even in competition with railroads, have been so satisfactory that larger and better boats have taken the places of the old. On our western rivers the same changes may be expected; changes that are as beneficial to our agricultural interests as to the merchant or the boat owner—more so indeed, as the value of surplus produce chiefly depends on the cost of taking it to market. If our farmers can be advised of the bearing of all the facts connected with this subject, they will aid us in obtaining a geological survey of the State, and by enabling us to get our coals at a cheaper rate, will secure cheaper freights for their surplus provisions and breadstuffs; and this, allow me to say, would be one of the very least benefits they would receive from such a movement. Show the home man of enterprise, and foreign capitalist, sure locations for developing with profit, the coal and iron, and other mineral resources of the State, and they will soon bring the mouths to the food, the consumer to the producer, and make a market on the land for the products of the land. Let it be understood that the Indiana farmers are now paying a sum for transit expenses on what they import, and on the exports they make to pay for these imports, greater than would suffice to manufacture their cloths and hardware, and the thousand foreign commodities required by their convenience and necessities, and they would soon cease to exchange the cheap and bulky products of home labor for the costly and compact products of foreign machinery and skill. No State in the world, taking into view her rich and level soil, water communications, equable climate and centrality of position, has greater mineral attractions than Indiana. Very few have as great. What we want is the certain knowledge of the position, purity and quantity of these minerals; and when other States are bringing their resources into notice,

by the investigations and publications of men of science, it can hardly be expected that foreign manufacturers and capitalists will take the cost and trouble of first explorations off our hands. I feel entirely confident that the taxables of the county of Perry, would now be ten, if not twenty fold, greater than they are now, had Dr. Owen's geological reconnoissance of 1837 been continued and enlarged into a systematic and thorough survey. Other counties would have witnessed the same results.

“ Since 1848, our coal has attracted a cash capital of nearly a million of dollars, and a population of about four thousand. The pay rolls of our mines and cotton mills now reach two hundred and fifty thousand dollars a year for labor alone. Could we have had an official endorsement of the facts brought before the public by us, and thereby avoided the imputation of interested statements, we might have made far more successful draughts on foreign capital and skill. Our experiment of manufacturing cotton, in a first class western mill, has been, as a whole, eminently successful. The increase of this branch of industry here and at other favorable points on the coal sections of the State, is as certain as the fact that, in all the older countries, manufacturing facilities, far inferior to ours, have invariably attracted a dense and thrifty manufacturing population. The question is merely one of time. I have not the present leisure to discuss this, or to answer your second inquiry more fully than to say that our cotton goods are equal to any of their class made elsewhere; that our labor is, to say the least, as abundant, efficient and reliable as can be found; that we have an advantage in the convenience, quality and cheapness of our material, over the New England mills, and on the fixed capital employed, of about ten per cent. per annum; that our subsistence, power and heat are cheaper than can be obtained in any manufacturing district; and that we need only a full set of cotton mills and the home supplies of auxiliary work shops, which such a set of mills would employ, to show a less cost of spinning

and weaving the great staple of our country, than can be shown in any cotton mills in Europe or America.

“To give greater usefulness to this paper, I add to the foregoing general remarks a few of the details of finding, opening and working our Indiana coal seams. There is very little in foreign and eastern books on collieries and coal mines that is of practical use to those whose sole object is to find our coal with the least trouble, and then to work it at the least cost. In the following observations and diagrams, my design is to communicate such facts as our experience here has shown to be most important to those already engaged in or about entering upon the same business.”

\* \* \* \* \*

“Examine all the out-crops in the vicinity, and take their levels and distances with accuracy. If the facts spread on the map indicate uniformity of the thickness, ‘dip,’ inferior clays and superior slates, and sand rock strata, commence the entry at the lowest convenient level, being careful to make the mouth of the entry so firm as to resist the land slips above and on the sides. Too much care can not be well taken in this respect. The entry should be timbered thoroughly until the stratum of superincumbent slate or stone has a thickness of eight or ten feet. It should be driven double, about eight feet wide at the bottom and seven feet at the top, and about five feet in height; the coal pillar, separating its two parts, should be from ten to eighteen feet in width. The direction, of course, should be up the incline, and with the slip of the coal. By the way, on this side of the coal field, its face and level is nearly coincident with the magnetic meridian, and the dip at right angles west. To secure the easiest drainage and ventilation, (for the choke and fire damp, like water, flow down hill,) the entries and rooms should run eastwardly, or rather the main entries should run directly east, and the rooms on either side should run from  $5^{\circ}$  to  $10^{\circ}$  east of north and south, which usually will give sufficient drainage. Where it is impracticable to get at the coal from the west, the

double entry should be driven to the lowest attainable level in the mine, and then at right angles, forming what is called a 'sump' entry for purposes for drainage, and to which the pipes of the force or lift pump should extend. Sometimes it will be most economical to sink a shaft or well at this point, and pump up the water perpendicularly. The drainage arrangement being completed, the rooms should be commenced at the farthest point of the entry, at a width of eight feet, and widening out to five or six yards, depending on the character of the roof and the hardness of the coal. These rooms should be worked eighty yards, and with great regularity. Then another entry, and so on. The width of the pillars should be the same as the width of the rooms. There are two objects in commencing the working in the farthest end of the mine. First the drainage and ventilation is easier, and next, the pillar coal should be taken out as soon as practicable. If it stands over two years, there is very considerable cost in clearing away the fallen fragments of the roof, and, besides, the rooms soon become choked up and filled with water and foul air. Unless the miners (who work by the piece, and are very much in the habit of changing their localities,) are watched very closely, they will work the rooms irregularly, and most to their immediate advantage. By neglect of this care, mines are often absolutely ruined within the first year or two. The proprietor should have a carefully prepared map of the mine, and have it corrected every month or two by actual measurements. As we have no practical work on this subject, and as the English works are not always to be obtained, I give here a diagram of a mine properly laid off.

In our Western mines, the main entry has been usually made sufficiently high for an ordinary sized mule, the dwarf mules only being worked in drawing the single cars through the side entries and rooms. When the seam is less than three and one-half feet thick, the practice is to take up bottom to give sufficient height. The English practice is worth following here. Instead of making depth, which in



HORIZONTAL SECTION

OF A

COAL MINE.

The white spaces  
represent coal work-  
ed.

The black spaces  
represent the re-  
maining coal

Scale—100 feet to  
1 inch.

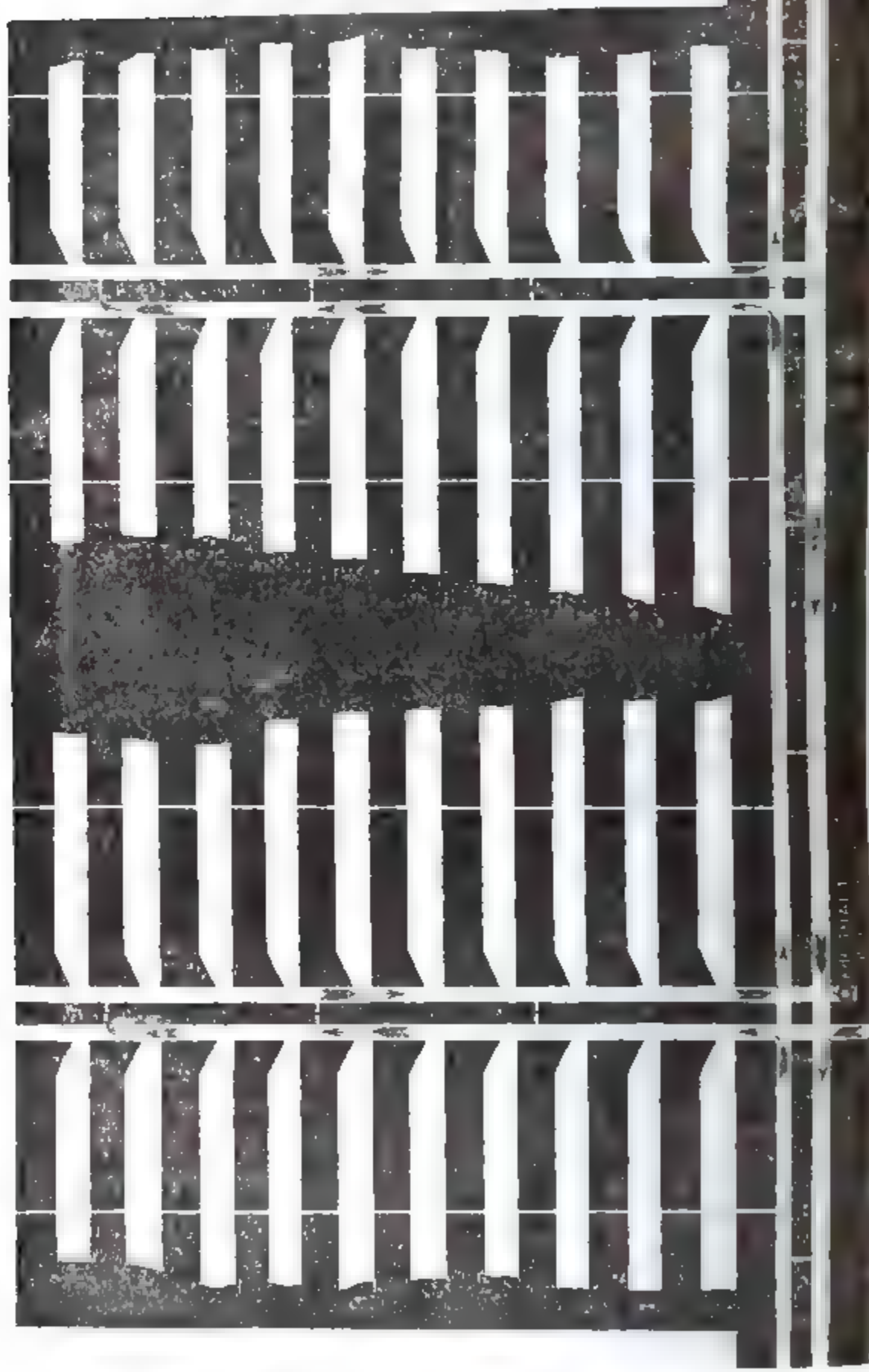
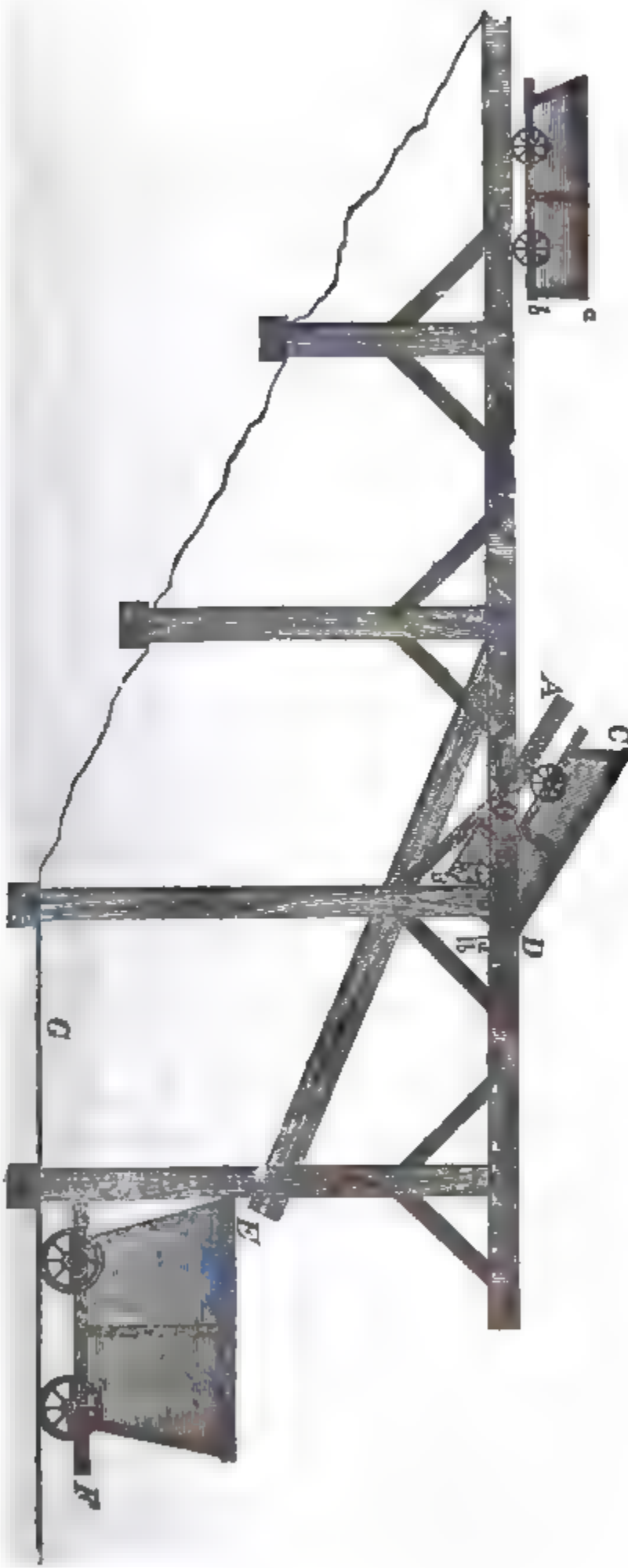


PLATE No. 2. [For description see pages 124 and 125.]



PLATE NO. 3.



[For description see page 128.]

most fire clays is difficult, they use low iron cars ; and instead of three by four inch wooden rail, they lay down a road with the flat iron bar, turned up on its edge, and keyed into sleepers placed about thirty inches apart. . These can be taken up and relaid with great readiness, and a boy can push a twenty bushel car upon them with great ease to the entry. The uninitiated will understand that these small cars must be brought into the rooms and within easy reach of the miner. The best size cars for our three to five feet seams is five feet six inches long, three feet four inches wide, and one foot eight inches high, holding twenty bushels ; the wheels ten inches in diameter, with flanges of one and one-half inches. Instead of the old-fashioned trap at the bottom of the car, we have adopted the tail-board, swinging on top hinges and tipped on a cradle. See diagram No. 3.

These cars are less expensive, are of less weight, and are more easily managed than the old. When an outside road is used, the cars of the most convenient size hold sixty bushels ; wheels two feet two inches in diameter, and, if the road has curves of less than eight hundred feet radius, the axles as well as the wheels should be made so as to revolve. Perhaps the best guage for the road is four feet eight inches, and certainly the best rail for a coal road that I have seen is the T rail of twenty-six pounds to the yard, made by the Louisville Rolling Mill Company.

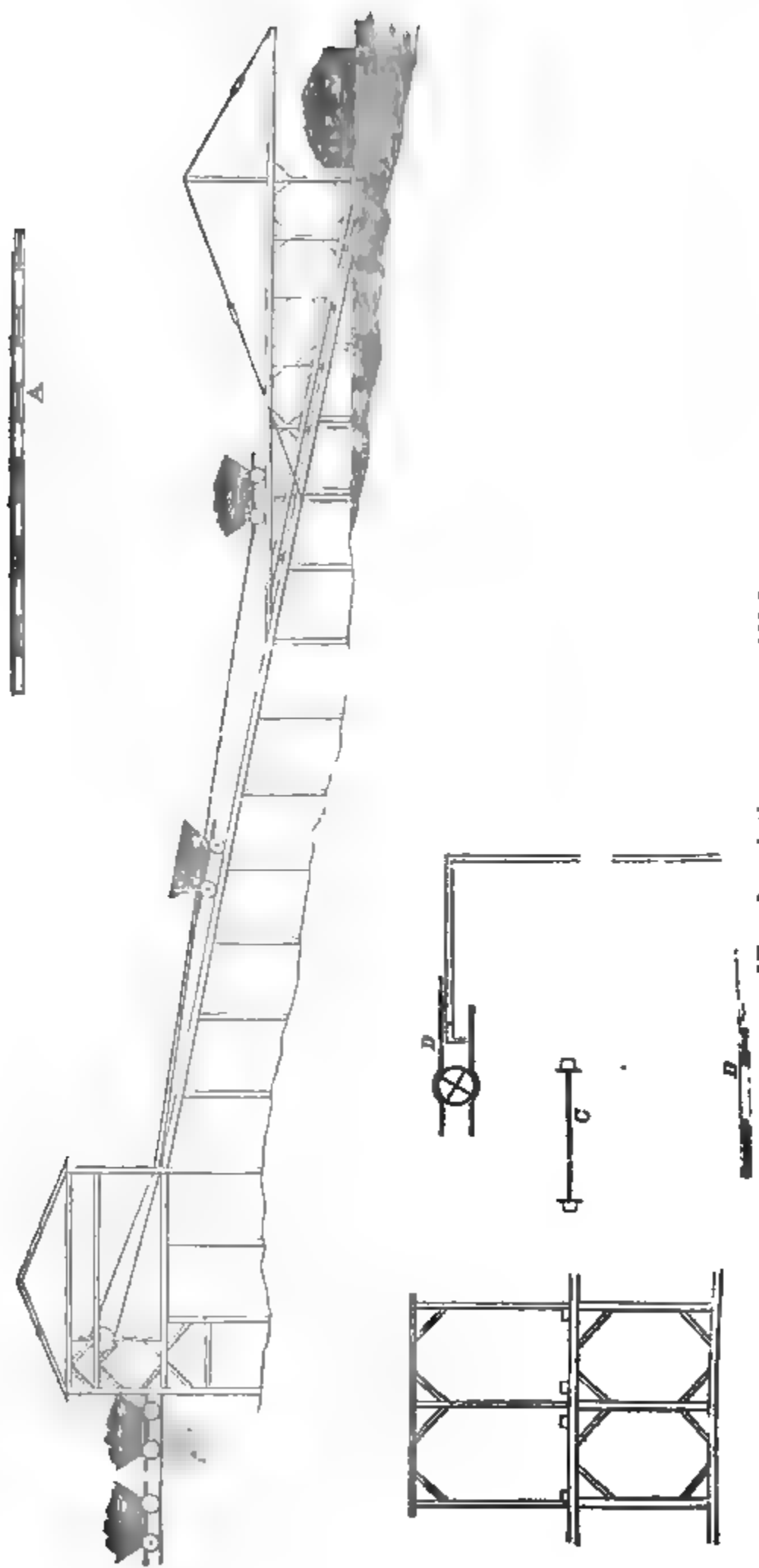
When a regular descending grade of from thirty to sixty feet to the mile can be obtained, there is great economy in running a train of cars with a platform car, in which the mules can ride down hill. Cars will run by gravitation, on a good road, with a grade of about thirty-five feet to the mile. Theoretically, about nineteen feet will answer ; but in cold weather, and when just starting, thirty to forty feet is little enough. On a grade of fifty feet to the mile, two mules will easily draw four empty sixty bushel cars and their own platform. We regard a descending grade of from thirty to sixty feet to the mile as more favorable than any other, because the mules can do so much more work when

pulling but in one way. Probably mule power is cheaper than steam power, whatever may be the extent of the delivery, when the road is not over two miles in length. It is often an economical arrangement to use planes to get from a lower to a higher elevation, the empty car being drawn up by loaded cars, by use of drum, rope and brake. An inclination of one foot in eight, or  $7^{\circ} 11'$  is sufficient. The form of the track on the plane, with a self-acting switch, is given in plate number 4. Thirty thousand bushels can be run over such a plane, of moderate length, in twelve hours. When a plane is necessary at the mine, it is better to draw up the large cars than to let down the bank cars; and a turn-table should not be used, when the road can be connected with the foot of the plane by a curve of over  $40^{\circ}$ . When coal is to be delivered into boats, and on a river subject to rapid rise and fall, we find a plane and slide, with a double track, decidedly the most convenient and economical arrangement. This, I believe, originated here, and is still peculiar to the Ohio river mines in this coal field.

It is equally appropriate to the Wabash and White rivers, and I give the form in plate No. 5. The best grade is one inch in five. All these fixtures at the river should be made with great strength and accuracy. With a proper drum-house, they will cost from \$2,500 to \$3,000, and, in the long run, the best are the cheapest. The saving of the labor of a single man, or the damage sustained by the running off of a few cars, is more than equivalent to the interest and decay of a well-made work. A section of the double road and turnouts at the drum-house is given in Fig. 2, plate 4. Before leaving this branch of the subject, I may state that iron car bodies are not as good as those made of oak covered with sheet iron, where the coal, falling from the chute will strike. The outside cars should be discharged by a trap at the bottom.

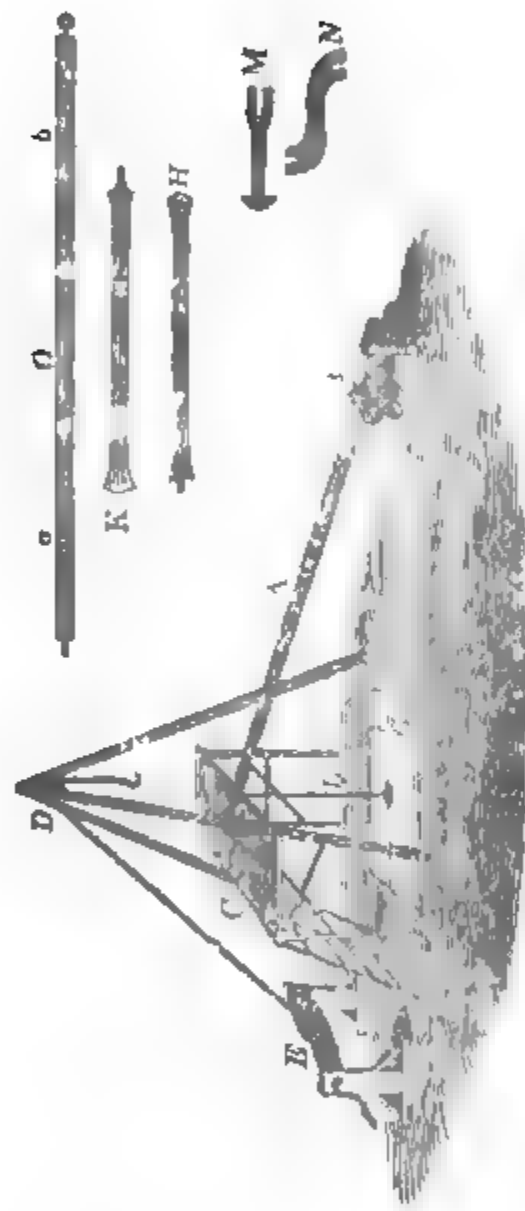
When the probabilities of finding a good coal seam at a depth of less than a hundred feet approach certainty, shaft-

PLATE NO. 5.



[For description see page 128.]

# PLATE NO. 6.



[For description see page 136.]

ing is far preferable to boring.\* If successful, the cost of boring is saved, and besides, the evidence obtained by boring is rarely satisfactory. When there are no such strong probabilities, boring, as a far cheaper process, should be resorted to. Plate No. 6 shows the manner in which this is done, and the character of the tools used. The screws can be obtained at any of the large cities, and any country blacksmith can fit up the whole apparatus.

The English use iron rods, in four feet sections; in this country, a few short sections, say one-half, one, two and three feet, and the others eighteen feet, with ash rods carefully fastened into iron sockets, are preferred from their cheapness and lightness. A little practice will enable ordinary laborers to manage this apparatus. For the first fifty or sixty feet, it is easiest to bore by hand; at a lower depth, use the spring pole. Unless a chisel should chance to break, no great skill is demanded in the mere drilling and taking up of the debris. Portions of this should be carefully examined whenever the sound or feel of the rod indicates a change of strata at its bottom. Here is the difficulty, and one which very few understand. Any intelligent person, who will take the trouble to pound up the different kinds of sand rocks, slates and coal, and examine the particles separately with a magnifying glass, can very nearly approximate the truth by making the same examination of the particles brought up by the pump used with the rods. I would advise such to trust to their own care and judgment, instead of relying on any common miner. There are plenty of these miners who understand the use of the rods, and who will keep on boring as long as they get well paid. With such a workman, a constant personal inspection may answer. Where there is any doubt of the character of the particles brought up, it would be well to send small parcels to some experienced geologist. This can be done by mail with little

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\* In making experimental shafts, say four feet square, the air may be kept pure by the use of a blacksmith's bellows, and gum elastic hose attached to its nozzle.

trouble. Of course these particles should be well dried before examination. There can be no mistake in distinguishing coal or coal shale from the rock. It is, however, difficult to distinguish the coal from the shale lying immediately upon the coal. Yet a close inspection with a good glass will enable one to see the sharp and glossy fracture of coal even in very fine pieces. Another obvious test is combustion; although some of the coal seams have a semi-combustion shale, often six or eight inches thick, immediately above the coal. It requires great experience to distinguish the true coal slate. Thousands of dollars have been expended in this vicinity in boring and shafting through a "bastard slate," that an expert would have abandoned as soon as struck. It lies here from fifteen to sixty-five feet under our main coal.

Whenever the shaft is determined on, place it as near as convenience will allow over the greatest depression of the coal in the property to be worked, so that the miners can communicate at the bottom of the grade.

All our coals are worked by the excavation of a few inches of the bottom of the seam or in the "bearing in slate," which is almost uniformly found under the Cannelton seam of a thickness of several inches between the coal and the fire clay. The miner "bears in" as far as he can reach with the pick, say three to four feet. The importance of keeping this space free from water is evident, and the consequent expediency of working up the incline."

\* \* \* \* \*

When the coal is won by blasting, the powder is generally furnished by the employer. The sharpening of tools is done by the employer at a charge of about seventy-five cents per month. The mule drivers in the bank get two and a half cents per load when the distance is not over five hundred yards. The taking up bottom is usually paid by the piece, and runs from twelve and a half to twenty-five cents per lineal yard. Opening entries, as far as props are necessary, about \$3.25 the lineal yard, the proprietors furnishing the props and taking the coal. The posts can be

furnished when the timber is convenient at \$6 per hundred; the puncheons, with which the top and sides are protected, are worth \$1.25 per hundred, making the whole cost per lineal yard \$4. Beyond the timbers the cost ranges from \$2.75 to \$3 per yard. Wages paid by the day and month will average about this:

For shafting and for purposes of ventilation or proving coal we usually pay \$1 per foot for first thirty feet, increasing fifty cents every ten feet.\* The price paid for mining is enormously high, when we regard the character of the labor. In one of our mines, leased to Messrs. D. Newcomb & Co., the pay roll of last month gave an average to miners of \$49; to the bank mule drivers, who are boys of ten to fifteen years of age, \$21; and to outside hands and road layers, \$35. Perhaps one-third of the miners were never in a coal mine before last year, and some had been in but a few weeks. The best miners made from \$60 to \$80. Now this work is not more laborious, not more unhealthy and not as dangerous as wood chopping. Our miners have been remarkable for their good health, and there has been but one fatal casualty among them here for twenty years, as the result of this employment. This was caused by the falling down of a part of the roof, and the miner was warned by the Superintendent of the danger, and directed to remove it. His death, therefore, was the result of his own culpable neglect. Until recently, most of the miners on the lower Ohio, have come from the English and Welsh coal mines;

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\* COST OF CARS, ETC.

Sixty bushel cars.....	each	\$150 00	
Twenty bushel cars (wood bodies).....	each	25 00	
Twenty bushel cars, iron bodies 150 lbs. sheet.....	each	27 00	
Picks, weight 1½ lbs., sell to miners at.....		75	
Rakes, weight 6 lbs., sell to miners at.....		1 25	
Wedges, weight 2½ lbs., sell to miners at.....		25	
Sledges, weight 8 lbs., sell to miners at.....		1 00	
Shovels, No. 2, sell to miners at.....		1 25	
Cost at Pittsburg \$9 per dozen.			
Bank mules, from 3 feet 7 to 4 feet 2 inches.....		\$55 00	
Cost of breaking.....		10 00	
			65 00



have generally been indisposed to settle permanently at any place, or to work at any other employment, when the mines from any cause were closed. The irregularity in the demand also had a tendency, not only to keep them unsettled, but gave them time and opportunity to combine against employers and to keep up prices. Within a few years, however, we have received a large number of emigrants from the mineral districts on the Rhine, whose first object is a freehold. They are making excellent miners and thrifty citizens; with scarcely any exception, they invest their first savings in the purchase and improvement of a lot, which is generally selected in the vicinity of the town, and sufficiently large for a garden and small vineyard. They seem to comprehend fully the mutual interests that exist between themselves and their employers, and in the dull season they are willing to work at a price which the employer can afford to pay. They are, perhaps, the only miners who will readily take advantage of a double field of labor.

The superabundance of miners at the German collieries is indicated by the very low prices paid at them—say from eighteen to twenty cents a ton of 2,240 pounds for digging, and about one and thirty-five one-hundredths for coal at mouth of pit. These collieries are worked far beneath the “grass,” and the coal is inferior to and harder than ours. At the Welsh and English collieries, the cost of mining is much lower than here; a thirty inch seam is often worked at less than three-tenths of a cent per bushel.

Taking into consideration the freedom of our mines from foul air and explosive gas, there would seem to be no good reason why our prices should be maintained whenever and wherever we obtain a regular demand for our coals. This demand is increasing with great rapidity, and this year it is very far beyond our means of supply. When the same changes are made below the Falls of the Ohio in the means of transit that have already taken place above the Falls; that is, when the steam tug and barges are substituted for the unwieldy flat boat, the coal depots from Cairo to the

Balize will demand from us a very large quantity, perhaps 25,000,000.\*

## DESCRIPTION OF PLATE NO. 6.

FOR PLATE, SEE PAGE 131.

*A* is a stout spring pole, fastened down at the thick end, and resting upon the prop *B*. Near the small end a small stave is passed through, affording a hand-hold to two men standing on the platform, *C*. *D* is a triangle erected over the platform, and also exactly over the spot for boring, sustaining a pully-block and rope, the latter attached to the windlass, *E*. *F G* is a flooring of planks, with a hole in the center through which the rods work. These rods, *H R*, are of iron, four feet long, an inch in diameter, and tapped with good screws at their ends, which are somewhat swelling out to give strength. The lowermost rod, which operates upon the rock or other stratum, is a sort of chisel, *K*; the uppermost terminates in a stout ring, through which passes the cross-piece, *L*, and which, in working, is taken hold of

\*The cost of towage with capacity of barges, tug, etc., was estimated at the last meeting of the Coal Association of the lower Ohio, thus :

FIXED CAPITAL.—Boat of six hundred tons, drawing light, four and a half feet, six boilers, twenty-five inches cylinder, fourteen feet stroke.....		\$30,000
Twenty-four barges, holding 11,000 bushels each, at \$1,500...		36,000
		<hr/>
		\$66,000
Interest, insurance and deterioration.....		22,400
Cost of crew, provisions and oil per month \$1,470, eight months season.....		11,360
Six hundred bushels coal per day, two hundred and forty days, at seven cents.....		10,080
Twelve trips of 88,000 bushels each, at seven cents.....		73,920
Insurance on coal, ten per cent., (too large by half).....		7,392
Contingencies.....		1,000
		<hr/>
Cost of 1,056,000 bushels in New Orleans.....		\$126,552

Or a fraction under thirty cents the barrel of two and a half bushels; or 4-1,000 cent per mile transit cost.

by two men ; it is also suspended to the springing pole by a chain. One of the rods is formed at the end with a shell like a common augur, and is used for the purpose of bringing up portions of the detritus formed by the action of the chisel. The mode of operation is as follows: One or more rods being pushed into the ground through the hole in the planks, the two men on the stage taking hold of the cross stave at the end of the springing pole, work it up and down, while the two men below, by means of the cross, simultaneously heave and depress the suspended rod, walking at the same time slowly round the hole—by these combined operations making way through whatever substance may come in contact with the chisel on the lower rod. When it is wished to ascertain the stratum they are passing through, or to clear the hole of the loose matter at the bottom, the rods are withdrawn by means of the tackle described above, the chisel is unscrewed and replaced by the shell, when they are again lowered to extract the detritus for examination and clearance. *M* is the spanner used for screwing and unscrewing the rods, and *N* an iron fork, the prongs of which are placed across the rod below the swell, and in contact with the floor, to prevent the lower series from slipping down while the upper one is being screwed off or on. *O* is an ash rod, eighteen feet long, with male and female screws on iron sockets, *d a, b c*, strongly bolted to the wood. This rod is found lighter and better in deep borings than the short iron rod, *H*. Where water is used in boring, the shell above described is replaced by a hollow copper cylinder, a little less in diameter than the chisel, from two to four feet long, open at the top, with an ordinary pump valve near the bottom. As the cylinder is put down, the valve is forced open and the tube filled. As the cylinder is withdrawn, the valve is closed by the pressure above, retaining the matter forced in by the descent.

*Tertiary:* There is near the top of the hills at Cannelton, and at Tell City, a deposit of small rounded gravel and ferruginous, sandy clay, that resembles very much a deposit of similar character which is seen on the banks of the Ohio river, in McCracken county, Kentucky, and near Elizabeth, in Massac county, Illinois. At the latter locality it is cemented into a compact pudding stone, and forms the rocky obstruction across the Ohio river, known as the Grand Chain. Here it is, without doubt, correctly referred to the tertiary, as it is associated with the strata which contains well known fossils that characterize that age. But in Perry county, the deposit is quite limited in area, and has furnished so far no evidence beyond the mere lithological resemblance to the above, that will warrant its assignment to a period more remote than the drift. In this county it rests on carboniferous shale and where seen is covered with clay and soil.

*Quaternary:* The brown marly clay characteristic of this epoch is seen on the top of the high hill at the Pottery Company's property, just above Troy; and it also makes its appearance on the Mound hill, below the mouth of Indian creek, in the edge of Spencer county. It varies from ten to fifteen feet in depth, and though often rich in fossil shells, I was unable to find any in it here.

*Building Stone:* No county in the State is better supplied with building stone that can be so conveniently quarried and sent to market. The great cliff of sandstone over two hundred feet in height which faces the Ohio river and reaches from Cannelton to Rock Island, a distance of more than two miles, has, in the series of layers of which it is formed, two massive beds that furnish excellent building stone; these beds are, in places, from twenty to forty feet thick without a seam, and blocks may be quarried of any required size. The layer just above the "top coal," seam G, is said to furnish the best stone, and it is from this layer that the stone was obtained which was used in building the cotton

mill and the Catholic church at Cannelton. These buildings are handsome structures and of elegant design. The color of the stone is light brown and when first quarried it is quite soft and easy to work; but hardens after being exposed to the air. The lower quarry is very similar in structure to the upper layer, but is more liable to contain imperfections. The color is also about the same as that of the upper seam. The Cannelton quarries furnished the stone used in the construction of the locks on Green river in Kentucky; for the abutments and piers of the Elizabethtown and Paducah Railroad bridge over the Tennessee river; for the railroad bridge over the Cumberland river; and for the railroad bridge over the Wabash river at the Grand Chain; as well as for the construction of the Government Navy Yard at Memphis, the locks of the canal at Louisville, and many other important works; and under all conditions it has proved to be a strong and durable stone.

*Lime:* There is an abundance of limestone in the eastern part of the county suitable for making lime, but I believe that no attention has been paid to its manufacture.

*Oil Wells:* During the great oil excitement in 1865-6 quite a number of wells were bored in the northern part of this county, on the waters of Anderson creek and Oil creek. These wells were generally carried to the depth of 700 feet, and in one or two of them there was found a little oil and gas, but not sufficient to be of the least value. The others were without any results whatever, and the territories which had been leased for this purpose, after the expenditure of large sums of money, were abandoned.

I have not, so far, been able to get any reliable account of the strata through which these wells passed. If records were kept they have been lost or taken away by the parties who superintended the work. Though it is extremely doubtful if oil in paying quantities, can be found in the county, still, I do not believe that these wells were carried to a sufficient depth to reach the Corniferous and Niagara

limestones from whence the oil is obtained in the Terre Haute well.

*Manufactures:* I have already written of the numerous extensive manufacturing establishments in this county, and I desire here merely to call attention to the advantages which it offers for the manufacture of iron. Though the Cannelton coal may not quite answer in the raw state for the manufacture of iron, it will make a very good coke, and by mixing the two together a fuel is obtained that is in every way suited to the blast furnace. Iron ore may be brought in barges from Missouri and the Cumberland river ore banks at a small cost for transportation, and the large deposits of ore which exist at and in the vicinity of Leopold, though rather silicious to be worked alone, may serve an admirable purpose to mix with the more refractory specular ores of Missouri. The blast furnaces in Newport and Covington, Kentucky, and those of Pittsburg, Pennsylvania, get a large portion of their supply of ores either by way of the river or by rail from Missouri; and it is reasonable to suppose, therefore, that the cost of producing a ton of pig iron in Perry county may be considerably lessened by the saving on freight alone.

*Agriculture:* By far the greater portion of Perry county is broken and uninviting for agricultural pursuits; but its rugged parts are being rapidly settled up by an industrious class of Germans and French, who, by careful tillage, obtain fine crops of corn, barley, wheat, oats and grass; clover grows well on the hill lands, which are also well adapted to the growth of orchard fruits. One of the largest and best orchards in this part of the State is situated six miles above Cannelton, and was planted by Hon. John C. Shoemaker, and lately sold by him to Charles G. French of Indianapolis. This orchard has for its rocky foundation the conglomerate sandstone which forms a steep cliff about two hundred feet above high water, where the farm fronts on the Ohio river. It is well stocked with all the best varieties of apples and peaches, and on the property there is also a fine

vineyard. Grapes seem to do well wherever they have been tried in the county when the vines are not enfeebled by excessive pruning.

The bottom lands, especially along the river, are among the finest farming lands in the State. In places, as at Tobin's Point, the bottom is broad and very extensive; indeed, it here covers the entire point, which is formed by a great bend in the river.

The soil of the bottom land is, for the most part, a sandy loam, and is particularly suited to grow corn, grass, potatoes, turnips and cabbage, though all the cereals do well. Hon. James Hardin raised last year, on his farm near Rome, two hundred and fifty bushels of potatoes to the acre, but one hundred and twenty-five bushels is considered an average crop. About 25,000 bushels are produced annually in Tobin township alone. In Union township about 100 acres are planted in cabbage, for market, and 3,000 heads are the usual number raised per acre. They sell readily at three cents per head and are a profitable and easily raised crop. The yield of grass will average one and a half tons to the acre, and the yield of corn about fifty bushels to the acre.

Tobacco grows well on either the hill or bottom lands, but there is very little attention given to its culture.

*Timber:* The large forest trees that were within easy reach of the river have mostly been cut down and converted into lumber, but in the interior, and especially in the northern part of the county, there are tracts of land with scarcely a tree destroyed. The trees are very large and fine and are of every variety usually found in this latitude; those most numerous and suitable for lumber are Poplar, Black Walnut, White Walnut, Ash, Oak, Cherry, Beech and Sycamore. In addition to those most useful for lumber, there are large Hickories, Elm, Hackberry, Sassafras, Persimmon and occasionally Buckeye trees.

*Antiquities:* Mention has already been made of the deep mortar-like holes found in the rock houses, and of the fact

that these sheltered places were used by the aborigines as sepulchres for the dead, and I desire under this head to merely call attention to some other matters of interest connected with prehistoric man :

One mile above Rome, on Mr. Reynolds' farm, and on the second bottom of the Ohio river, which is here about ten feet above the overflow of that stream, there is an aboriginal shell heap which has been plowed over for many years and now corresponds to the general level of the field.

This heap of refuse from the kitchens of the aborigines, is mainly composed of the shells of the fresh water *malusca* belonging to the family *unionidæ*. The shells are broken and in such a state of decomposition that, on being pressed between the fingers, they readily crumble into powder. Their decomposition in this place has been hastened by frequent disturbance in plowing, and the beneficial influence of the lime and phosphorus which they furnish to the soil, is quite manifest in the increased yield of this part of the field. The depth and area of this shell heap, or heaps—for there may have been a row of them—could not be determined on account of its disturbed condition, but there is reason to believe that it extended at least fifty yards along the low ridge. No bones of animals nor bone implements were seen, but just at the rear of the shell bed, with the assistance of Mr. Conner, I succeeded in finding several slightly broken stone axes, some stone pestles or grinder, and a number of flint arrow-heads and flint flakes, and he informed me that great quantities of arrow and spear-heads and other stone implements have been, from time to time, picked up on different parts of the field.

I heard of no mounds in this county, but there is a very large one in the edge of Spencer county, two miles below Troy. It is on the top of a high hill, is fifteen feet in height, oval in shape; and about thirty feet in its greater diameter. The decayed stump of an oak tree which grew on its side measured two feet in diameter. A hole had been dug in the top of the mound, but Dr. Gage, who owns the land, informed me that no relics had been found. From the top



of the mound there is a commanding view for several miles both up and down the river.

A great many highly interesting stone relics have been found in this county, the most important of which were sent by Hon. Hamil on Smith, to the Smithsonian Institution. Master Rudd Smith gave me a fine specimen of stone pestle or grinder that is made of green stone and worked quite smooth; and a very large and deep basin made of brown sandstone was obtained from the Hon. John C. Shoemaker, Auditor of State, which was found in a valley between Cannelton and Tell City. This basin is twelve inches outside diameter at the top, interior diameter nine inches, depth three inches, hight five and one-fourth inches, diameter of bottom which projects three-fourths of an inch below the bowl, six and one-half inches. It is symetrical in form and as smooth on both inside and outside as if it had been fashioned in a lathe. On opposite sides it has ears or projections by which to lift it.

*Conclusion:* Before closing these remarks on Perry county, I desire to return my thanks to its citizens generally for the courteous treatment which has been extended to me on every hand; and for the great interest manifested by them in the survey.

In addition to the persons whose special favors have already been mentioned in the body of the report, I desire to acknowledge my obligations to George Minto & Son, mining engineers; Aaron Evans, mining engineer; Roan Clark, William Clark, James R. Bence, Col. Hanning, Judge C. H. Mason, editor of the Cannelton Reporter; S. B. Hatfield, editor of the Examiner; John Peters, Recorder, and Samuel Platt, Esq., all of Cannelton. Also, to Samuel K. Conner and Dr. Gage, of Troy; W. B. Reynolds, Hon. James Hardin and John T. Conner, of Rome; Henry Delville, Andrew Loffenet and Rev. B. Unversaght, of Leopold; Abraham Lusher and A. Howe, of Lusher P. O.; and to S. Whitten, Mr. Steiner and Mathew Combs, of Tell City.



**GEOLOGICAL NOTES**  
**OF A TRIP**  
**FROM NEW ALBANY, IN FLOYD COUNTY**  
**TO**  
**HARRISON AND CRAWFORD COUNTIES.**

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It is twenty miles over a good turnpike road from New Albany to Corydon, in Harrison county. The "black slate" which crops out along the river bank at New Albany was bored by the late Dr. Clapp, and found to be one hundred and ten feet thick. It is the lowest rock seen along the route, and is soon carried beneath the surface by the westerly dip of the strata; and is succeeded by a greenish marly shale which carries from one to three bands of good limonite iron ore, formed by contiguous flattened masses two to four inches thick. From the weathering away of the soft shales in which it was embedded, this ore has fallen down, and vast quantities are seen in the ravines, and scattered over the sides of the hills. Just before reaching Edwardsville, six miles from New Albany, we lose sight of the knob shale and sandstone, and attain an altitude of four hundred to five hundred feet above the "black shale." From this point to

Corydon the road is over the cherty subcarboniferous limestone. The soil on the high ridges is reddish brown, and the subsoil a dark red clay, containing a large percentage of iron. These ridges are well adapted for growing all kinds of fruit, and the crop this year is large and the quality of the fruit very fine. Corydon was the second capital of the Territory of Indiana, and the first capital of the State. It is situated near the center of Harrison county, at the junction of Little and Big Indian creeks, and is a beautiful town. Its dwellings are neat and surrounded with yards that are tastefully adorned with flowers and shrubbery. The streets and sidewalks are clean, and free from dust and mud at all times, being covered with ferruginous sand and gravel that cements into a natural pavement.

There is an appearance of thrift on every hand, and the hospitable citizens are untiring in their attention to visitors. To enumerate all to whom I am under obligations for courtesies and aid in making my examinations while at Corydon, would occupy too much space in this brief notice, but I can not, even here, omit to speak of the assistance received from Hon. Thomas C. Slaughter, Benjamin P. Douglass, Dr. H. S. Wolf, Wm. T. Scott, Lieut. George Wilson, Henry Jordan, D. Jordan, Samuel J. Wright, Thomas McGrain, Samuel B. Lockett, Dr. J. C. Clark, Dr. Wm. Reader, and Rev. Thomas G. Beharrel.

A well has been bored for salt brine at Corydon, to the depth of one thousand and fifty feet, where the work is temporarily stopped. Moderately good brine was found at the depth of fifty-seven feet. At five hundred and twenty feet, the brine indicated thirty degrees of strength by the salometer. The greatest strength found was thirty-eight degrees at a depth of about seven hundred feet. Brine from a depth of six hundred and thirty feet was sent to the laboratory, some time last spring, for examination; it had a specific gravity of 1.064, and gave twelve and a half ounces of pure salt to the gallon of brine. One of the principal objects in carrying the well below the strongest brine, was to procure a flow of carburetted hydrogen gas that could be made

available as fuel for evaporating the water. Though small quantities of gas that would ignite and burn for a moment were found at different depths, no large quantity has yet been reached. The bore is now in a hard, gray limestone, and, in all probability, just above the Cincinnati group. If a sufficient quantity of gas is not found after reaching the shales of this group, it will not, in my opinion, justify to carry the bore deeper.

I visited an exposure of lithographic stone on Mr. Bringman's land, four miles southwest of Corydon. Lithographic stone is common in the subcarboniferous formation along the entire outcrop in Indiana, but as a general thing, the rock contains too many flaws and specks of calc-spar to furnish stone of good size. Here, however, judging from all I could see at an unworked exposure, perfect slabs of large dimensions may be had; and I had the promise of one upon which I expected to have had drawn a number of illustrations for this report.\*

In the same hill and lying above the lithographic bed are several layers of compact, fine-grained limestone that take a good polish; the colors are handsome, being mottled with black, reddish gray and dark brown, on a light gray base. These marbles may be used for ornamental work, such as table tops, mantles, etc.

One and a half miles east of Corydon, on the New Albany gravel road, there is a sulphur well, owned by Mr. Amos Zenor. It emits a strong odor of sulphuretted hydrogen, and is highly extolled for its curative properties by those who have tried it. According to an analysis made by Dr. Thomas E. Jenkins of Louisville, it contains 450.88 grains of salts in a wine gallon, consisting of bicarbonate of soda, bicarbonate of magnesia, sulphate of soda, sulphate of magnesia, sulphate of lime, chloride of sodium, chloride of

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\*Since the above was written a letter has been received from Hon. Thomas C. Slaughter, in which he states that a slab two feet wide, three feet long and six inches thick, had been taken out, too late, however, to be made available.

magnesium, chloride of calcium, silica, gases in solution, carbonic acid and sulphuretted hydrogen.

The well is thirty-eight and a half feet deep, and gives an abundant supply of water at all times.

Between the sulphur well and town there is a very large spring of cool, fresh water, known as the "Blue spring," owned by Mr. Heath. This spring has generally been thought, from old tradition to that effect, to be at least five hundred feet deep. Such a phenomenon was quite unlooked for, and I was anxious to test the matter. After obtaining a great quantity of string, seventeen feet proved ample to reach the bottom. It is deep enough and large enough to supply the wants of a moderate sized city. Eight miles a little north of west from Corydon is Wilson's spring. This spring gives rise to a considerable stream, which is used for milling purposes, and drives a large grist and sawmill. The stone arch covering the water-way under the grist mill was built, it is said, by General Harrison, who once owned the property. The basin, where the water breaks up, is about one hundred and twenty feet wide, and flows with a rapid current through a channel about forty feet wide. As nearly as we could ascertain, by sounding from the shore with a cord attached to the end of a pole, we made the depth to be about fifty-five feet. The stream formed by this spring is one of the principal tributaries to Blue river. It was quite muddy from the effects of the heavy rains which had fallen the day before our visit. Below its confluence with Blue river the latter stream was quite muddy, while above it the water was clear.

The muddy condition of the water of the spring is accounted for upon the theory that it receives the drainage water from a large field six miles north, where the water, which floods the ground at times, runs into a hole and disappears beneath the surface; straw has been carried, it is said, by this means from the field to the spring. Be this as it may it is evident that the Wilson spring receives a large amount of surface drainage water from subterranean sources, as that which is derived from the grassy banks surrounding

the basin could not have muddied the spring to the extent we saw it. The entire country covered by the subcarboniferous limestone formation is more or less cavernous and filled with subterranean streams. From quite a number of wells in Corydon eyeless fish and crawfish have been brought up in the buckets when drawing water.

Pitman's cave is about one mile north of Wilson's spring. Though small, compared with Wyandotte, this cave is said to contain a number of chambers filled with beautiful stalactites and stalagmites and crystalizations of gypsum. I was not aware of this fact until after leaving the neighborhood, and had to postpone a visit to it until another time. Rhodes' cave, five miles southwest of Corydon, contains so much water that it has never been explored. It is reported to contain a great many eyeless fish, and I hope before long to find time to visit it for the purpose of collecting its subterranean fauna. Eyeless fish appear to be quite numerous in all subterraneous waters, and I take pleasure in acknowledging the receipt of three fine living specimens of these fish from Mr. Moses N. Elrod and George R. Bannring, who caught them last September at the Gulf of Lost River, in Orange county. They were placed in the aquarium at the Geological rooms, and at this writing appear to be doing well.

The citizens of Corydon kindly sent us in a coach to Wyandotte Cave, ten miles west, in the edge of Crawford county, and close to Blue river, which forms the eastern boundary of the county. Besides Mr. Samuel S. L. Smith, who has been with me since leaving New Albany, I was accompanied by Rev. Thomas G. Beharrel and Lieutenant Wilson, of Corydon. The road is a good one, and after crossing Blue river, follows along the side of the limestone bluff which skirts the stream, and affords, by a little excavation here and there, room for a road between it and the river.

We reached the cave at noon, and were gladly welcomed by the lessee of the cave and hotel, Mr. Conrad, his kind lady and daughter. After partaking of a good and substantial dinner, we prepared to visit the cave under the

guidance of our host. By measurement, with the aneroid barometer, the mouth of the cave is found to be about one hundred and fifty feet above the bed of Blue river, and we have from the top of the ridge to the river the following section :

Covered slope,	-	-	-	-	20 ft.
Buff sandstone, with stems of fossil plants,					80 ft.
Archimedes limestone,	-	-	-	-	5 ft.
Shale and brown limestone,	-	-	-	-	35 ft.
Gray limestone,	-	-	-	-	20 ft.
Limestone, fine-grained, lithographic and oolitic,	-	-	-	-	50 ft.
Gray, cherty, encrinital limestone,	-				230 ft.
Bed of Blue river,	-	-	-	-	0 ft.

The geological position of the Wyandotte Cave is precisely similar to that of the Mammoth Cave in Kentucky. It traverses the cherty beds of the sub-carboniferous formation which contain sink holes, large basin-shaped pits, and subterranean caverns in numerous places over its entire area. The Wyandotte Cave lies above the valleys, and in its course conforms to the general direction of the ridges *i. e.*, northeast and southwest. It is said to be twenty-two miles in extent, if all the branches which have been explored are included, but the various routes taken by visitors are estimated at a total of nineteen miles. The cave is dry, and contains a few narrow passages, such as "Fat Man's Misery," "Augur Hole," "Screw Hole," and "Creeping Avenue," but for the most part the galleries are broad and high and frequently expand into great rooms. The crystalline ornamentations are particularly fine, and far excel in number and beauty those seen in the Mammoth Cave. Two of the rooms, the "Senate Chamber" and "Mammoth Hall," are of immense size and impressively grand. The former contains the "Pillar of the Constitution," formed by a stalacto-stalagmitic deposit about twenty-five feet in diameter and thirty feet high, reaching from the top of a great stalagmite hill to the ceiling above. The surface is fluted



and divided by three bands, which give it the appearance of being jointed like a cane. Around the sides of the hill are numbers of stalagmites, of various sizes and heights, that with their shining tops look like clusters of cypress knees. Stalactites adorn the ceiling, and one very large one is called the "Bell," from the ringing sound which it emits when struck. On the right of the "Pillar of the Constitution" stands the "Chair of State," formed by a peculiar stalactostalagmitic arrangement. Behind and in front of the chair is a gallery richly adorned with these calcite ornaments, and when this immense room, capable of seating several thousand persons, is lighted up, it is impossible to conceive of a grander or more imposing spectacle. The other contains "Monument Mountain," said to be one hundred and seventy-five feet high, on the top of which stands three great stalagmites; one, which is very white and has the appearance of being draped, is called "Lot's wife;" "Wallace's Grand Dome" is seventy feet above the top of the mountain or two hundred and forty-five feet above the main floor of the cave. The width of the hall is three hundred feet. In speaking of these rooms, Professor Cope, in his paper on the fauna of the Wyandotte Cave, published in the July number of the *American Naturalist*, says, "There is no room in the Mammoth Cave equal to these two."

I can not, at this time, undertake to describe all the points of interest to be met with in nineteen miles of travel through this charming cave, but will briefly allude to the "White Cloud," room with its wave like walls and ceiling coated with glistening crystals, like a frosting of snow; the "Island of Confusion," and "Purgatory," where the rocks have the same rich coating; "Pillard Palace," with its innumerable stalactites, arranged in clusters, twisted and turned in all directions, like Pharoah's serpents; "Beauties Bower," where the walls are covered with gypsum rosettes as white as snow; the "Snow Banks," formed by alabaster in fine powder; the "Gallery," where the floor glistens with acicular crystals of gypsum, of which I obtained some samples not larger than a darning-needle, arranged in bundles

six inches long, which were as clear as water ; and the rooms where the stones are covered with fine hair like crystals of epsom salts, from one to two inches long.

There is very little water in this cave ; the sulphur spring is a small basin of water, contained in a mere shell of calcite, apparently formed by the water itself. Crawfish spring is a small body of water in a remote corner of the cave ; it occasionally furnishes a blind crawfish, and I obtained from it a number of small eyeless crustaceans.

Sibert's, or Little Wyandotte Cave, close to the hotel, is entered by descending about twenty feet through a small hole, on an Indian ladder. This is a small cave, probably not over two hundred yards in extent, and is not excelled, if equalled, by the Wyandotte, in the beauty and charming arrangement of its stalactites and stalagmites. In one instance the two are united and form a semi-transparent pillar which is ten feet in length and three inches in diameter, and extends from the floor to the ceiling. Visitors should not fail to see this cave also.

Half a mile north of the Wyandotte is the " Saltpetre Cave," where in early times saltpetre was made, and one of the lixiviating troughs is still to be seen. It has but one room, which is of gigantic size, and reaches upward into an immense " step-like " dome. This cave is also worth a visit.

I had the good fortune to secure the services of the eminent naturalist, Professor Edward D. Cope of Philadelphia, when he was in attendance at the Indianapolis meeting of the American Association for the Advancement of Science, to visit the Wyandotte cave and make a report on its fauna.

This interesting and valuable report will be found immediately following these notes.

It will be seen that Professor Cope collected sixteen species of cave animals ; but I was not so fortunate ; with the assistance of Mr. Smith, Mr. Conrad, and Mr. Sibert, only seven species were taken.

Centipedes, and the small crustacean that furnishes food for the blind fish, are abundant in the cave, and numbers

of them were collected. A blind fish, three blind crawfish, a small brown eyeless beetle and an out-door fish, "Miller's Thumb," were also collected in a small cave that is reached by going down a well at the foot of a ridge traversed by the Wyandotte cave.

The well is about twenty feet deep, and the bottom of the cave, to which it leads, is about on a level with the bed of Blue river.

In times of freshets, water fills the cave and flows out of the well. At the time of my visit the water was low, and only a very narrow and shallow stream was flowing through it, and we were compelled to crawl on our hands and knees over the slimy rocks, and occasionally in the water, in order to reach the small pool where we captured the eyeless fish and crawfish. Only one fish was seen, but the crawfish were frequently seen darting about in the clear water and crawling along the bottom. The latter soon became aware of our presence and effectually hid themselves beneath the rocks. The "Miller's Thumb" was caught on a ripple where the water was scarcely deep enough for him to swim. It is possible that this fish reached the cave through some channel which connects it with the river, or it may have been thrown into the well by some fisherman.

With the exception of its animals, there is nothing of special interest in this cave.

It may be well to state for the benefit of persons desiring to visit the Wyandotte cave, that it is thirty miles distant from New Albany, from which place there is a daily coach to Corydon, twenty miles, where hacks are to be had at all times for the remaining ten miles of the route, so that you may reach the cave before night. From Louisville there are packets which leave every evening at 5 o'clock and reach Leavenworth at about 11 o'clock P. M. the same day. Leavenworth is four miles from the cave, and you will find here good accommodations at the Ouerbacker Hotel, kept by Mrs. Humphries. Mr. Ouerbacker, her son, owns the wharf boat, and strangers will have no difficulty in finding their way to the hotel. Carriages are always

ready to take you out to the cave, which you will reach after an hour's ride over a romantic road.

Mr. H. W. Conrad, the lessee of the property, has established a large and commodious hotel at the cave. He is an accommodating gentleman, and you may be sure of kind treatment and comfortable quarters. Mr. Willis Sibert, the guide, has been raised on the property, and is well acquainted with every nook and corner of the cave, and under his guidance you can not fail to enjoy a visit to it. Indeed, no tourist should fail to visit the Wyandotte cave, where the grottoes filled with crystals rival in beauty the ideal grottoes of the genii, and the great domed rooms, with high hills surmounted by huge stalagmites, stand unrivaled among the subterranean wonders of the world.

Ladies who design visiting the cave should provide themselves with a Bloomer costume, made of flannel or some moderately warm goods. With such a dress they may, without inconvenience, go to every part that is explored. The temperature varies in the different parts of the cave, and ranges from 53° to 57° Fahrenheit. The air is pure and exhilarating, and very little fatigue is felt from long walks.

The Louisville and Henderson packet steamboats leave Leavenworth every evening, between 6 and 8 o'clock for Louisville, where they arrive next morning by daylight. Visitors going down the river may leave by these boats at 11 o'clock and reach Evansville by noon of the next day.

At Leavenworth, in this county, a bore has been started for salt brine, and is now 207 feet deep. Here it has been temporarily stopped by gravel falling in from a crevice which was struck 87 feet below the surface. After tubing below this crevice it is thought the difficulty encountered from gravel wedging in the drill may be removed, and the company design pushing the bore on down. In my opinion they will reach good brine at about 600 or 700 feet.

Eight miles from Leavenworth, on the west fork of Little Blue river there is a remarkable sulphur well. It was bored in 1864 for oil. At the depth of 275 feet in the subcarbon-

iferous limestone, a stream of "white" sulphur water was reached, which rushed up the well with tremendous force, carrying with it the tools, and put a stop to further boring. An ineffectual attempt has been made to test the height to which the well would throw water. A wooden tube, 45 feet long, was placed in the mouth of the bore, and the water flowed over the top, but the hydrostatic pressure was so great that it burst the bottom of the tube, and water was forced through the earth for many feet around. It is the common opinion that the water will rise, if properly confined, at least 70 feet.

The surface of the ground, and every object over which the water flows, is coated with a white deposit of sulphur. It is cool and clear, and has a strong odor of sulphuretted hydrogen gas, and its medicinal properties are highly extolled by all who have tested its virtues. Until recently there were no accommodations for invalids or other visitors, but now the well has fallen into the hands of Mr. R. A. Curry, who is making ample arrangements to render comfortable all who may desire to visit this great well, spouting at least 15,000 barrels of water per day, and test its hygienic powers. We found quite a number of visitors at the well, and among them Captain Holcroft and his family, Miss Roberts, of Kentucky, and Dr. Wood, of Cannelton, Indiana.

Mr. Robert H. Sands, of Leavenworth, accompanied me to the well, and laid me under further obligations by a present of some beautiful fossils from the carboniferous rocks of Kentucky.

In the northern part of Indiana there are a number of localities where fresh-water chalk (soft carbonate of lime) is found.

The deposits lie along the shores of the little island lakes which are so numerous in that part of the State. Some time last year, Hon. Stephen Davidson, member of the Indiana State Board of Agriculture, from Rochester, Fulton county, brought me a box of this chalk which he obtained near that place. It was analyzed and found to contain in 100 parts :

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Moisture, dried @ 212° F.,	-	-	-	5.00
Organic matter,	-	-	-	4.50
Carbonate of lime,	-	-	-	81.10
Carbonate of magnesia,	-	-	-	1.51
Carbonate of alkalies,	-	-	-	6.18
Phosphate of lime,	-	-	-	.11
Alumina and oxide of iron	-	-	-	1.60
				<hr/>
				100.00

While engaged in writing this report, other samples of fresh-water chalk have been received from DeKalb county. One sample, from F. W. McConnell, M. D., of Angola, was taken from a deposit on the shore of Silver lake, that is said to be 16 feet thick, and is nearly pure carbonate of lime. Another specimen was brought to the laboratory by Hon. E. B. Glasgow, of the same place, which was sent by Mr. O. Carpenter who struck it in digging a well, about half a mile back from the present shore of the lake.

The fact of finding this chalk at such a distance inland indicates that the bed has a considerable area, and that the shore line of the lake has been changed by a diminution in the volume of its water.

This chalk will make a good caustic lime, but on account of its purity, will require a much larger proportion of sand mixed with it in making mortar than lime that does not set so rapidly. It will also make an excellent fertilizer and an admirable mineral to mix with peat-muck for improving poor soils.

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# REPORT

ON THE

## WYANDOTTE CAVE AND ITS FAUNA.

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BY PROF. E. D. COPE.

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The Wyandotte Cave traverses the St. Louis limestone of the carboniferous formation in Crawford County in southwestern Indiana. I do not know whether its length has ever been accurately determined, but the proprietors say that they have explored its galleries for twenty-two miles, and it is probable that its extent is equal to that of the Mammoth Cave in Kentucky. Numerous galleries which diverge from its known courses in all directions have been left unexplored.

The readers of the NATURALIST\* have freshly in their memories the interesting papers of Messrs. Packard and Putnam on the fauna of the Mammoth Cave and related species. The writer accompanied the excursion so pleasantly described in the NATURALIST, and obtained most of the species there enumerated, as well as two or three additional ones which will be mentioned at the close of this article. On returning to Indianapolis at the request of Prof.

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\* American Naturalist, published at Salem, Mass., July number, 1872.

E. T. Cox, State Geologist of Indiana, I made an examination of the Wyandotte Cave, so far as two days' exploration could be called such. Having prepared by report, I present a portion of it, by permission of Prof. Cox, to the NATURALIST.

The Wyandotte Cave is as well worthy of popular favor as the Mammoth. It lacks the large bodies of water which diversify the scene in the latter, but is fully equal to it in the beauty of its stalactites and other ornaments of calcite and gypsum. The stalactites and stalagmites are more numerous than in the Mammoth, and the former frequently have a worm or macaroni-like form, which is very peculiar. They twist and wind in masses like the locks of Medusa, and often extend in slender runners to a remarkable length. The gypsum rosettes occur in the remote regions of the cave, and are very beautiful. There are also masses of amorphous gypsum of much purity. The floor in many places is covered with curved branches, and what is more beautiful, of perfectly transparent acicular crystals, sometimes mingled with imperfect twin-crystals. The loose crystals in one place are in such quantity as to give the name of "Snow Banks" to it. In other places it takes the form of japanning on the roof and wall rock.

In one respect the cave is superior to the Mammoth—in its vast rooms, with step-like domes, and often huge stalagmites on central hills. In these localities the rock has been originally more fractured or fragile than elsewhere, and has given away at times of disturbance, piling masses on the floor. The destruction having reached the thin-bedded strata above, the breaking down has proceeded with greater rapidity, each bed breaking away over a narrower area than that below it. When the heavily-bedded rock has been again reached, the breakage has ceased, and the stratum remains as a heavy coping stone to the hollow dome. Of course the process piles a hill beneath, and the access of water being rendered more easy by the approach to the surface, great stalactites and stalagmites are the result. In one place this product forms a mass extending from floor to ceiling, a



distance of thirty or forty feet, with a diameter of twenty-five feet, and a beautifully fluted circumference. The walls of the room are encrusted with cataract-like masses, and stalagmites are numerous. The largest room is stated to be 245 feet high and 350 feet long, and to contain a hill of 175 feet in height. On the summit are three large stalagmites, one of them pure white. When this scene is lit up, it is peculiarly grand to the view of the observer at the foot of the long hill, while it is not less beautiful to those on the summit. There is no room in the Mammoth Cave equal to these two.

I must not omit to mention the kind attention to the wants of his guests constantly displayed by Mr. Conrad, the present proprietor of the hotel, and the equally useful guidance of Mr. Rothrock, the owner of the cave. Visitors will also find on their way thither an American Auerbach's hotel at Leavenworth, near the steamboat landing. This excellent house is not haunted, like its European predecessor at Leipzig, by either a Mephistophiles or a Faust, but by a landlord (Mr. Humphreys), whose charges are low, and whose wife knows how, in lodgings and table, to satisfy reasonably fastidious persons.

An examination into the life of the cave shows it to have much resemblance to that of the Mammoth. The following is a list of sixteen species of animals which I obtained, and by its side is placed a corresponding list of the species obtained by Mr. Cooke and others at the Mammoth Cave. These number seventeen species. As the Mammoth has been more frequently explored, while two days only were devoted to the Wyandotte, the large number of species obtained in the latter, suggests that it is the richer in life. This, I suspect, will prove to be the case, as it is situated in a fertile region. Some of the animals were also procured from caves immediately adjoining, which are no doubt connected with the principal one.

Of the out-door fauna which find shelter in the cave, bats are of course most numerous. They are probably followed into their retreat by the eagle and large owls. The

floors of some of the chambers were covered to a considerable depth by the castings of these birds, which consisted of bats' fur and bones. It would be worth while to determine whether any of the owls winter there.

I believe that wild animals betake themselves to caves to die, and that this habit accounts in large part for the great collections of skeletons found in the cave deposits of the world. After much experience in wood craft, I may say that I never found the bones of a wild animal which had not died by the hand of man, lying exposed in the forest. I once thought I had found the place where a turkey vulture (*Cathartes aura*) had closed its career, on the edge of a wood, and it seemed that no accident could have killed it, the bones were so entire as I gathered them up one by one. At last I raised the slender radius; it was broken, and the only injured bone. I tilted each half of the shaft, and from one rolled a single shot! The hand of man had been there. One occasionally finds a mole (*Scalops* or *Condylura*) overcome by the sun on some naked spot, on his midday exploration, but if we seek for animals generally, we must go to the caves. In Virginia I found remains of very many species in a recent state; in a cave adjoining the Wyandotte I found the skeleton of the gray fox (*Vulpes Virginianus*.) In a cavern in Lancaster county, Pennsylvania, in an agricultural region, I noticed bones of five or six *Cistudines*, as many rabbits, and a few other wild species, with dog, horse, cattle, sheep, etc., some of which had fallen in.

#### LIST OF LIVING SPECIES IN THE TWO CAVES.

##### WYANDOTTE.

##### MAMMOTH.

##### *Vertebrata.*

*Amblyopsis spelæus* DeKay.

*Amblyopsis spelæus* DeKay.

*Typhlichthys subterraneus* Girard.

##### *Arachnida.*

*Erebomaster flavescens* Cope.] ~~—~~ *Acanthocheir aramata* Tellk.

*Phrixis longipes* Cope.

*Anthrobia.*

*Anthrobia monmouthia* Tellk.

*Crustacea.*

<i>Orconectes inermis</i> Cope.	<i>Orconectes pellucidus</i> Tellk.
<i>Cæcidotea microcephala</i> Cope.	<i>Cæcidotea stygia</i> Pack.
<i>Cauloxenus stygius</i> Cope.	<i>Stygobromus vitreus</i> Cope.

*Insecta.*

<i>Anophthalmus tenuis</i> Horn.	<i>Anophthalmus Menetriesii</i> Motsch.
<i>Anophthalmus eremita</i> Horn.	<i>Anophthalmus Tellkampfi</i> Erichs.
<i>Quedius spelæus</i> Horn.	<i>Adelops hirtus</i> Tellk.
<i>Lesteva</i> sp. nov. Horn.	
<i>Raphidophora</i> .	<i>Raphidophora subterranea</i> Scudd.
<i>Phora</i> .	<i>Phora</i> .
<i>Anthomyia</i> .	<i>Anthomyia</i> .
<i>Machilis</i> .	<i>Machilis</i> .
<i>Campodea</i> sp.	<i>Campodea Cookei</i> Pack.
<i>Tipulid</i> .	

*Myriopoda.*

<i>Spirostrephon cavernarum</i> Cope.	<i>Scoterpes Copei</i> (Pack.) Cope.
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The blind fish of the Wyandotte Cave is the same as that of the Mammoth, the *Amblyopsis spelæus* DeKay. It must have considerable subterranean distribution, as it has undoubtedly been drawn up from four wells in the neighborhood of the cave. Indeed, it was from one of these, which derives its water from the cave, that we procured our specimens, and I am much indebted to my friend N. Bart. Walker, of Boston, for his aid in enabling me to obtain them. We descended a well to the water, some twenty feet below the surface, and found it to communicate by a side opening with a long low channel, through which flowed a lively stream of very cool water. Wading up the current in a stooping posture, we soon reached a shallow expansion or pool. Here a blind crawfish was detected crawling round the margin, and was promptly consigned to the alcohol bottle. A little further beyond, deeper water was reached, and an erect position became possible. We drew the seine in a narrow channel, and after an exploration under the bordering rocks secured two fishes. A second haul secured another. Another was seen, but we failed to catch it, and on emerging from the cave I had a fifth securely in my hand, as I thought, but found my fingers too numb to prevent its freeing itself by its active struggles.

If these Amblyopses be not alarmed, they come to the surface to feed, and swim in full sight like white aquatic ghosts. They are then easily taken by the hand or net, if perfect silence is preserved, for they are unconscious of the presence of an enemy except through the medium of hearing. This sense is, however, evidently very acute, for at any noise they turn suddenly downward and hide beneath stones, etc., on the bottom. They must take much of their food near the surface, as the life of the depths is apparently very sparse. This habit is rendered easy by the structure of the fish, for the mouth is directed partly upwards, and the head is very flat above, thus allowing the mouth to be at the surface. It thus takes food with less difficulty than other surface feeders, as the perch, etc., where the mouth is terminal or even inferior; for these require a definite effort to elevate the mouth to the object floating on the surface. This could rarely be done with accuracy by a fish with defective or atrophied visual organs.\* It is therefore probable that fishes of the type of the *Cyprinodontidæ*, the nearest allies of the *Hypsæidæ* and such *Hypsæidæ* as the eyed *Chologaster*, would possess in the position of the mouth a slight advantage in the struggle for existence.

The blind crawfish above mentioned is specifically distinct from that of the Mammoth Cave, though nearly related to it. Its spines are everywhere less developed, and the abdominal margins and cheles have different forms. I call it *Orconectes inermis*, separating it generically from *Cambarus*, or the true crawfishes, on account of the absence of visual organs. The genus *Orconectes*, then, is established to include the blind crawfishes of the Mammoth and Wyandotte Caves. Dr. Hagen, in his monograph of the American *Astacidæ*, suspects that some will be disposed to separate the *Cambarus pellucidus* as the type of special genus, but thinks such a course would be the result of erroneous rea-

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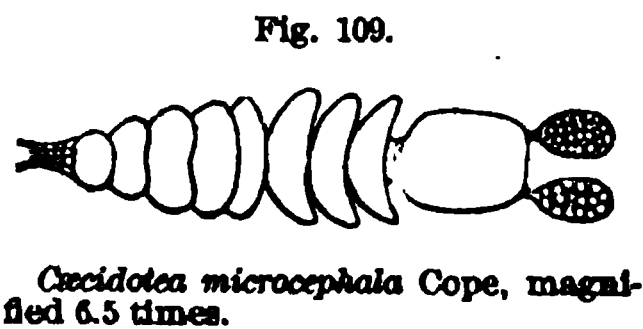
\* Mr. Putnam's objection to my reasoning from the structure of the Amblyopsis' mouth was based on a misconception of my meaning. The above explains the point more fully.

soning. Dr. Hagen's view may be the result of the objection which formerly prevailed against distinguishing either species or genera whose characters might be suspected of having been derived from others by modification, or assumed in descent.

The prevailing views in favor of evolution will remove this objection; and for myself I have attempted to show\* that it is precisely the structural characters which are most obviously, and therefore most lately, assumed on which we have been in the habit of depending for discrimination of genera. The present is a case in point. So far also as the practice of naturalists goes, this course is admissible, for the presence or absence as well as the arrangement of the eyes have long been regarded as generic indications among the Myriopoda and Arachnida. Without such recognition of a truly structural modification our system becomes unintelligible.

Dr. Packard described in his article already quoted, an interesting genus of Isopoda allied to the marine form *Idotea*, which Mr. Cooke discovered in a pool in the Mammoth Cave. He called it *Cæcidotea*.

I obtained a second species in a cave adjoining the Wyandotte, which differs in several important respects. The head is smaller and more acuminate, and the bases of the antennæ are more closely placed than in *C. stygia* Pack. I call it *Cæcidotea microcephala*.



Both species are blind. The new species is pure white. It was quite active, and the females carried a pair of egg pouches full of eggs. The situation in which we found it was peculiar. It was only seen in and near an empty log trough used to collect water from a spring dripping from the roof of one of the chambers.

The Lernæan *Cauloxenus stygius* Cope, is a remarkable

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\*Origin of Genera p. 41

Fig. 110.



*Oecidotea microcephala* Cope. The mandible and palp of right side more enlarged. The outer palpus lies above the lateral plate, and its origin was not seen.

creature. It is a parasite on the blind fish, precisely as numerous species near of kin, attach themselves to various species of marine fishes. The Wyandotte species is not so very unlike some of these. It is attached by a pair of altered fore-limbs, which are plunged into the skin of the host and held securely in that position by the barbed or recurved claws. The position selected by the blind fish *Lernæan*, was the inner edge of the upper lip, where she hung in a position provocative of attempts at mastication on the part of the fish and reminding one of the picture of the man on the ass, back holding a fork of fodder before the animal's nose, in illustration of the motto that "persuasion is better than force." The little creature had an egg pouch suspended on each side, and was no doubt often brought in contact with the air by her host.

This position would not appear to be a favorable one for long life, as the body of the *Cauloxenus* would be at once caught between the teeth of the fish, should its direction be reversed or thrown backwards. The powerful jaw-arms, however, maintained like a steel spring a direction at a strong angle with the axis of the body, which was thrown upwards

Fig. 111.



*Cauloxenus stygius* in position on the lip of *Amblyopels spelæus*, enlarged.

over the upper lip, the apex of the cephalothorax being between the lips of the fish. This position being retained, it becomes a favorable one for the sustenance of the parasite, which is not a sucker or devourer of its host, but must feed on the substances which are caught by the blind fish, and crushed between its teeth. The fragments and juices expressed into the water must suffice for the small wants of this crustacean.

But if the supply of food be precarious, how much more so must be the opportunities for the increase of the family.

No parasitic male was observed in the neighborhood of the female, and it is probable that as in the other *Lernæopodidæ*, he is a free swimmer, and extremely small. The difficulty of finding his mate on an active host-fish must be augmented by the total darkness of his abode, and many must be isolated owing to the infrequent and irregular occurrence of the fish, to say nothing of the scarceness of its own species.

Fig. 113.



*Onuloxenus stygius*. A n-  
tennal process and mus-  
cle more en-  
larged.

The allied genera, *Achtheres* and *Lernæopoda*, present very distinct distributions, the former being fresh water and the latter marine. *Lernæopoda* is found in the most varied types of fishes and in several seas; *Achtheres* has been observed on

Fig. 112.



*Cauloxenus stygius*. The animal viewed from below, with an infero-lateral view of the cephalothorax.

perch from Asia and Europe, and in a South American *Pimelodus*. It is to the latter that *Cauloxenus* is most nearly allied, and from such a form we may perhaps trace its descent; modification being consequent on i

wandering into subterranean streams. The character which distinguishes it from its allies, is one which especially adapts it for maintaining a firm hold on its host, i. e., the fusion of its jaw-arms into a single stem.

Whether the present species shared with the *Amblyopsis* its history and changes, or whether it seized upon the fish as a host at some subsequent period, is a curious speculation. Its location at the mouth of the fish could scarcely be maintained on a species having sight, for if the host did not remove it, other individuals would be apt to.

I may here allude to another blind Crustacean which I took in the Mammoth Cave, and which has been already mentioned in the Annals and Magazine of Natural History as a Gammaroid. Mr. Cooke and myself descended a hole, and found a short distance along a gallery, a clear spring covering, perhaps, an area ten feet across. Here Mr. Cooke was so fortunate as to procure the *Cæcidotea stygia*, while I took the species just mentioned, and which I name *Stygobromus vitreus*. The genus is new and represents in a

measure the *Niphargus* of Schiodte found in the caves of Southern Europe. It resembles, however, the true *Gammarus* more closely, by characters pointed out at the close of this article. This genus has several species in fresh waters, which are of small size, and swim actively, turning on one side or the other.

Of insects I took four species of beetles, all new to science. Two of them of the blind carnivorous genus *Anophthalmus*, and two *Staphylinidæ*, known by their very short wing-cases and long, flexible abdomen. Dr. George H. Horn has kindly determined them for me. One of them, the *Quedius spelæus* Horn, is a half inch in length, and has rather small eyes.\* It was found not far from the mouth of the cave. Dr. Horn furnishes me with the following list of Coleoptera, from the two caves in question :

<i>Anophthalmus Tellkampfi</i> Erichs.	Mammoth Cave.
<i>Anophthalmus Menetriesi</i> Motsch,	
<i>angulatus</i> Lec.	Mammoth Cave.
<i>Anophthalmus eremita</i> Horn.	Wyandotte Cave.
<i>Anophthalmus tenuis</i> Horn.	Wyandotte Cave.
<i>Anophthalmus striatus</i> Motsch.	Mammoth Cave. Unknown to me.
<i>Anophthalmus ventricosus</i> Motsch.	Mammoth Cave. Unknown to me.
<i>Adelops hirta</i> Tellk.	Mammoth Cave.

These are the only true cave insects at present known in these fauna. Other species were collected within the mouths of the caves, but which can not be classed with the preceding, as cave insects proper.

<i>Catops</i> n. sp.?	Wyandotte Cave
<i>Quedius spelæus</i> Horn.	Wyandotte Cave.
<i>Lesteva</i> n. sp.	Wyandotte Cave.

And another *Alæocharide* *Staphylinide*, allied to *Tachyusa*, also from Wyandotte Cave. No names have as yet been given to any of these excepting the second. A monograph of *Catops* has already appeared containing many species from our fauna, and as the work is inaccessible at present, I have hesitated to do more than indicate the presence of the above species.

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\*See Proceed. Amer. Entom. Soc., 1871, p. 332.



Two other species of true cave insects are known in our fauna; *Anophthalmus pusio* Horn, (Virginia) Erhart's Cave, *Anophthalmus pubucens* Horn, (Illinois) Cave City Cave.

The cricket of the Wyandotte Cave is stouter than that of the Mammoth and thus more like the *Raphidophora lapidicola* of the forest. There were three species of flies, one or more species of *Poduridæ* and a *Campodea* not determined.

Centipedes are much more abundant in the Wyandotte than in the Mammoth Cave. They especially abounded on the high stalagmites which crown the hill beneath the Mammoth dome, which is three miles from the mouth of the cave. The species is quite distinct from that of the Mammoth Cave and is the one I described some years ago from caves in Virginia and Tennessee. I call it *Spirostrephon cavernarum*, agreeing with Dr. Packard that the genus\* to which it was originally referred is of doubtful validity. The species is furnished with a small triangular patch of eyes, and is without hairs, but the antennæ are quite elongate. Its rings are quite handsomely keeled. The allied form found by Mr. Cooke in the Mammoth Cave has been described by Dr. Packard as *Spirostrephon Copei*. It is eyeless and is, on this account alone, worthy of being distinguished generically from *Spirostrephon*, though the absence of pores asserted by Dr. Packard, would also constitute another character. *Spirostrephon* possesses a series of lateral pores as I have pointed out in accordance with Wood's view.† This genus may be then named *Scoterpes*. I look for the discovery of *S. cavernarum* in the Mammoth Cave.

Two species of Arachnidans were observed, one a true spider, the other related to the "long-legs" of the woods. A species, similar to the former is found in the Mammoth Cave, and others in other caves, but in every instance where I have obtained them, they have been lost by the dissolution of their delicate tissues in the impure alcohol. The

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\**Pseudotremia*.

†Proceed. Amer. Entom. Soc., 1870.

other forms are more completely chitinized and are easily preserved. They are related to the genus *Gonyleptes* found under stones in various portions of the country. Dr. Wood describes a species from Texas, and I have taken them in Tennessee and Kansas. In the Wyandotte Cave I found a number of individuals of a new species at a place called the Screw Hole. This is a narrow passage between masses of rock, which rise from the end of a gallery to the floor of a large room called the Senate Chamber. Though living at a distance of four or five miles from the mouth of the cave, this species is furnished with eyes. Its limbs are not very long, but its palpi are largely developed, and armed with a double row of long spines pinnately arranged, like its relative of the Mammoth Cave, the *Acanthocheir*. This species is described at the end of the article as *Erebomaster flavescens* Cope. In its relationships it may be said to stand between *Acanthocheir* and *Gonyleptes*.

Fig. 114.

*Erebomaster flavescens*, magnified 7.6 times.\*

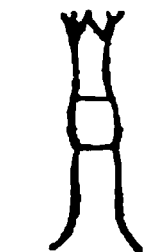
Besides *Acanthocheir*, another blind Gonyleptid exists in the Mammoth Cave, which I found several miles from the mouth. It is blind like the former, but differs in having many more joints to the tarsi, approaching thus the true *Phalangia*, or long-legs. There are six joints and terminal claws, while *Acanthocheir* is said to have two and *Erebomaster* three joints. It is larger than *A. armata*, and has much longer legs. Its palpi are also longer and their spines terminate in long hairs. I have named it *Phrixis longipes*.

Dr. Packard and Mr. Putnam, have already discussed the

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\*Our engraver has not correctly represented the posterior lateral border of the large dorsal scutum. The mandible should also have been represented as terminating in a pair of nippers.—Eds.

Fig. 116.



Erro-  
master  
aves-  
cens  
Male or  
gan from  
below.

question of the probability of the origin of these blind cave animals by descent from out-door species having eyes. I have already expressed myself in favor of such view, and deem that in order to prove it, we need only establish two or three propositions. First, that there are eyed genera corresponding closely in other general characters with the blind ones; second, that the condition of the visual organs is in some cave type variable; third, if the abortion of the visual organs can be shown to take place coincidentally with general growth to maturity, an important point is gained in explanation of the *modus operandi* of the process.

First, as to corresponding forms; the *Typhlichthys* of the Mammoth is identical\* with *Chologaster*, except in its lack of eyes. *Orconectes* bears the same relation to *Cambarus*; *Stygobromus* bears nearly the same to *Gammarus*, and *Scotterpes* is *Spirostrephon* without eyes, and no pores.

Secondly, as to variability. I have already shown that in *Gronius nigrilabris*, the blind Silurid from the Conestoga in Pennsylvania, that while all of several specimens observed were blind, the degree of atrophy of the visual organs varies materially, not only in different fishes, but on different sides of the same fish. In some, the corium is imperforate, in others perforate on one side, in others on both sides, a rudimental cornea being thus present. In some, the ball of the eye is oval and in others collapsed. This fish is related specifically to the *Amiurus nebulosus* of the same waters, more nearly than the latter is to certain other Amiuri of the Susquehanna river basin to which the Conestoga belongs, as for instance the *A. lynx*; it may be supposed to have been enclosed in a subterranean lake for a shorter time than the blind fishes of the Western caves, not only on account of the

\*Mr. Putnam shows that the known species of *Chologaster* differ from those of *Typhlichthys* in the lack of the papillary ridges, which is probably another generic character similar to the loss of eyes. The absence in *Chologaster* of minute palatine teeth, and the presence of an additional pair of pyloric cæca, which he mentions, will be apt to prove only specific.

less degree of loss of visual organs, but also in view of its very dark colors. A feature on which I partly relied in distinguishing the species, has perhaps a different meaning. The tentacles or beards were described as considerably shorter than those of allied species. On subsequently examining a number of individuals, I was struck with the irregularity of their lengths, and further inspection showed that the extremities were in each case enlarged, as though by a cicatrix. I have imagined that the abbreviation of the tentacles is then due to the attacks of carnivorous fishes which inhabit the subærial waters into which the *Gronias* strays, from whom its blindness renders it unable to protect itself.

Thirdly, it is asserted that the young *Orconectes* possess eyes and that perhaps those of the *Typhlichthys* do also. If these statements be accurate, we have here an example of what is known to occur elsewhere; for instance, in the whale-bone whales. In a foetal stage, these animals possess rudimentary teeth like other Cetacea, which are subsequently absorbed. This disappearance of the eyes is regarded with reason by Professor Wyman as evidence of the descent of the blind forms from those with visual organs. I would suggest that the process of reduction illustrates the law of "retardation," accompanied by another phenomenon. Where characters which appear latest in embryonic history are lost, we have simple retardation; that is, the animal in successive generations fails to grow up to the highest point, falling farther and farther back, thus presenting an increasingly slower growth in this special respect. Where, as in the presence of eyes, we have a character early assumed in embryonic life, the retardation presents a somewhat different phase. Each successive generation, it is true, fails to come up to the completeness of its predecessor at maturity, and thus exhibits "retardation," but this process of reduction of the rate of growth is followed by its termination in the part, long before growth has ceased in other organs. This is an exaggeration of retardation. Thus the eyes in the *Orconectes* probably once exhibited at maturity the incomplete characters now found in the young, for a long time a retarded

growth continuing to adult age before its termination was gradually withdrawn to earlier stages. Growth ceasing entirely, the phase of atrophy succeeded, the organ becomes stationary at an early period of general growth, being removed, and its contents transferred to the use of other parts by the activity of "growth force." Thus for the loss of late assumed organs we have "retardation," but for that of early assumed ones, "retardation and atrophy."

In comparing the list of animals from the Wyandotte with that of the Mammoth Cave, it will be observed that the representatives in the former, of two of the blind genera of the latter, are furnished with eyes. These are the *Erebomaster* and *Spirostrephon* which correspond with the *Acanthocheir* and *Scoterpes* respectively. In the outer part of a branch of the Wyandotte I took two eyed beetles the *Quedius spelæus* and a *Platynus*.

The out-door relatives of the blind forms are various. Those having congeners outside are the *Spirostrephon*, *Cam-podea*, *Machilis Phora*, *Raphidophora*. Those with near but few allies, the *Scoterpes*, *Amblyopsis* and the three *Gony-leptidæ*. Species of the latter are much more rare in this country than those of *Phalangiidæ*, which are not known from the caves. The *Orconectes* is mostly fresh water in kindred, while Packard shows that those of the *Cæcidotea* are marine. Those of the *Cauloxenus* are partly marine, and those of the *Stygobromus* fresh water and marine.

The mutual relations of this cave life form an interesting subject. In the first place, two of the beetles, the crickets, the centipede, the small crustaceans (food of the blind fish) are more or less herbivorous. They furnish food for the spiders, crawfish, *Anophthalmus*, and the fish. The vegetable food supporting them is in the first place fungi, which in various small forms, grow in damp places in the cave, and they can always be found attached to excrementitious matter dropped by the bats, rats and other animals which extend their range to the outer air. Fungi also grow on the dead bodies of the animals which die in the caves, and are found abundantly on fragments of wood and boards brought in by human

agency. The rats also have brought into fissures and cavities communicating with the cave, seeds, nuts and other vegetable matters, from time immemorial, which have furnished food for insects. Thus rats and bats have, no doubt, had much to do with the continuance of land life in the cave, and the mammals of the post-pliocene or earlier period, which first wandered and dwelt in its shades were introducers of a permanent land life.

As to the small crustaceans, little food is necessary to support their small economy, but even that little might be thought to be wanting, as we observe the clearness and limpidity of the water in which they dwell. Nevertheless the fact that some cave waters communicate with outside streams is a sufficient indication of the presence of vegetable life and vegetable debris in variable quantities at different times. Minute fresh water algæ no doubt occur there, the spores being brought in by external communication, while remains of larger forms, as confervæ, etc., would occur plentifully after floods. In the Wyandotte cave no such connection is known to exist. Access by water is against the current of small streams which discharge from it. On this basis rests an animal life which is limited in extent and must be subject to many vicissitudes. Yet a fuller examination will probably add to the number of species and of these, no doubt, a greater or less number of parasites on those already known. The discovery of the little Lernæan shows that this strange form of life has resisted all the vicissitudes to which its host has been subjected. That it has outlived all the physiological struggles which a change of light and temperature must have produced, and that it still preys on the food of its host as its ancestors did, there is no doubt. The blindness of the fish has favored it in the "struggle for existence," and enabled it to maintain a position nearer the commissariat, with less danger to itself than did its forefathers.

## DESCRIPTIONS OF SPECIES FROM THE WYANDOTTE CAVE.

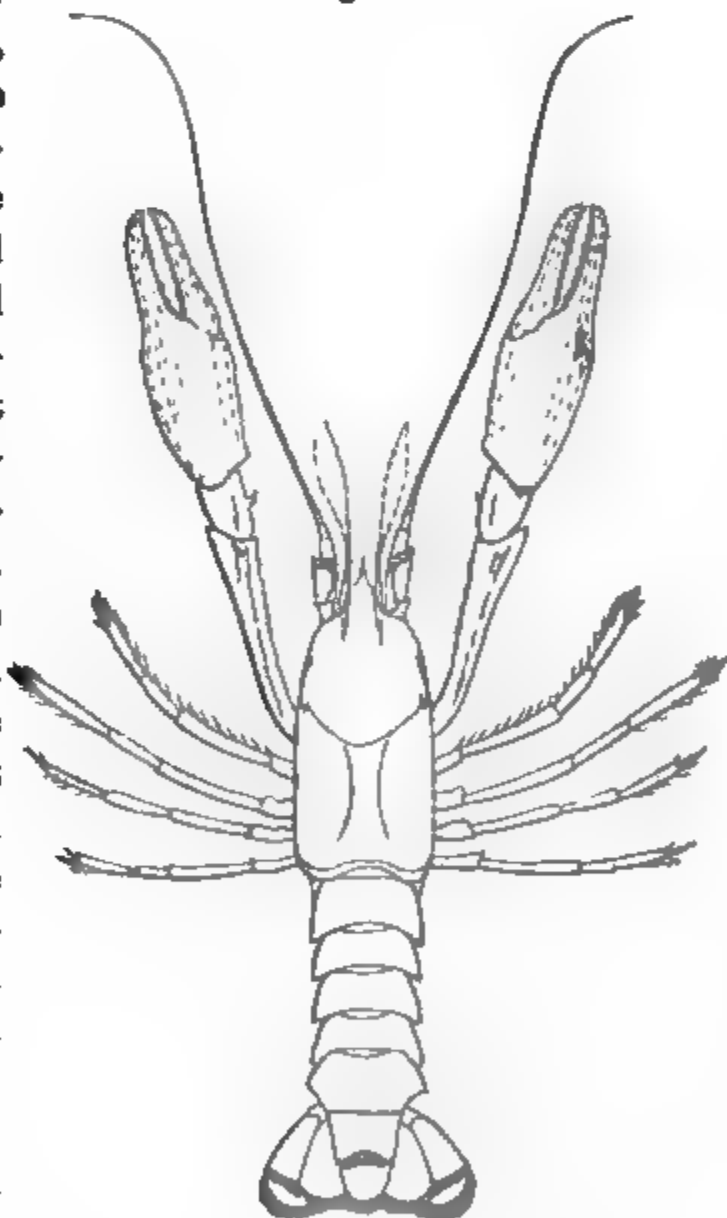
### ORCONNECTES COPE.

Genus novum. Similar to *Cambarus*, but with the eyes rudimental with the cornea small and not fucetted. The present genus embraces two species, the *O. inermis* of the Wyandotte and the *O. pellucidus* of the Mammoth Cave.

*O. INERMIS* Cope, sp. nov. This species is near the *O. pellucidus*, and differs as follows. Its proportions are generally less slender, and the spines less developed. The

Fig. 116.

frontal process is considerably shorter, the terminal spine not extending beyond the apex of the antennal lamellæ and very little beyond the point of bifurcation of the first antennæ. In *O. pellucidus* the spine extends much beyond these points. The lateral points mark the middle of the length and support very rudimental spines; they are elongate in *O. pellucidus*. The basal lateral ridges are marked and convergent; basal spines short. The antennal lamellæ are much enlarged



*Orconectes inermis* Cope, nat. size.

at the middle and contracted below, and are furnished with a fringe of long hairs. At the base of the second antenna

the margin of the thorax has a projecting convexity moderately developed. On the side of the thorax there is a small patch of weak prickles, and there are two on the anterior lateral suture of the abdomen. In *O. pellucidus* these spines are larger and much more numerous. The lateral outlines of the postabdominal segments are those of one extremity of an ellipse with a slight angulation at the extremity; in *O. pellucidus*, these are rectangular, with the hinder margin straight distally.

The chelae are slender, but less so than in *O. pellucidus*, the opposed processes are flat and not ridged along the middle as in that species, and the general surface is smooth or nearly so, without the tubercular roughness of *O. pellucidus*. The chelae of the second and third legs partake of the broader form of the first. The third femora of the third and fourth legs with short hooks. The spines of the basal segments of the first legs are much as in the old species. The shell of the specimen taken early in September was very soft on the abdominal segment, but well calcified elsewhere. Color white. Total length head and body, m.054 ( $=2\frac{1}{8}$  in.). Length spine from thorax margin .0055. Length cheliform segment of first legs, .024; width do., .0075; length movable (last) segment of do., .0123.

The single specimen of this species has been compared with four of the *O. pellucidus* in the Museum of the Academy Natural Sciences, one of which is young; the characters above alluded to are constant. They are also exhibited by Dr. Hagen's figure,\* except the slenderness of the chelae, which is less than in our specimens. This figure is copied by Dr. Packard.

#### CÆCIDOTEA PACKARD.

**C. MICROCEPHALA** Cope, sp. nov. Unknown crustacean with external egg-pouches, Cope. Ann. Magaz. Nat. Hist., 1871, November.

Abdominal segments confluent into a single one; thoracic

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\* Catalogue of the Museum Comparative Zoology. Monograph of the *Astacidae* of North America.



segments seven, well distinguished. Inner antennæ close together, situated between the larger outer ones both issuing from below the margin of the dorsal plate of the cephalic segment. The specimens are in bad condition, having lost their limbs, egg-pouches and the distal portions of their antennæ. The head is small, narrower and scarcely longer than the first thoracic segment. The segments are all smooth and without hairs or sculpture. The abdominal segment is quadrate-oval, truncate posteriorly, without projection or mucro, above regularly, but slightly convex. Egg-pouches well separated, oval in form, moderate in size. The limbs are given off from the free extremities of the segments. Branchial laminæ extending to the extremity of the abdominal segment, in contact throughout on the median line. Color pure white. Length with egg-pouches, but with only four basal joints of antennæ, 5-16th of an inch (m.0077.)

This species is near the *Cæcidotea stygia* of Dr. Packard (American Naturalist, 1871, pp. 751-2) and, as such, of much interest. It has a much smaller and more acuminate head than the *Cæcidotea stygia* Pack., though in general the species are not very different in other respects, and are of about the same size. In the *C. microcephala* the abdomen is truncate, in the longer known species, angulate.

This species may then be regarded as the representative of the *C. stygia* in the Wyandotte Cave.

#### CAULOXENUS COPE.

Fam. *Lernæopodidæ* Gerst. The adult female stout, sack-like, not articulated. Cephalothorax not elongate, large, separated from the abdomen by a strong constriction. Anchor or jaw-feet elongate, arm-like, closely united throughout their length, originating at or behind the middle of the cephalothorax. Cephalothorax undivided, abdomen rounded, sack-shaped, not segmented. Egg-pouches, short, wide.

This genus differs from its allies, *Achtheres* and *Lernæo-*

*poda* in the fusion of the jaw-limbs, between which a faint dividing depression only may be distinguished, when they are viewed from below. The form of the abdomen is much as in *Achtheres*, but segmentation is not distinguishable. The short, wide egg-sacks are as in other genera of this family; they are well separated and are filled with large, globular eggs.

The structure of the mouth organs is not readily determinable in my single specimen, owing to the intervention of the very stout jaw-feet. They are only visible in profile (see fig. 106.) A pair of perhaps first antennal segments projects from the head, is curved upwards and is without terminal bristle or hook; a short process at the base may represent a tactile appendage. The inferior antennæ are well marked and equally without appendage. There are some bodies between them, perhaps on the middle line, whose nature is not determinable. There is no trace of eyes. The chitinous stem of the common jaw-feet is rather long, and expands discoidally at the extremity.

C. STYGIUS Cope. Proceed. Acad. Nat. Sci., Phila., 1871, p. 297. Cephalothorax nearly as long as abdomen, oval, subcompressed; abdomen subround, subdepressed, separated by a rather long constriction. Egg-sacks rounded, shorter than abdomen, on very short pedicels. Jaw-limbs nearly as wide as the abdomen, and not quite so long, much constricted distally at the point of origin of the anchoring stem, which is nearly as long as the arm proper. No dermal appendages of any kind. Rostral region projecting above the arms, subconical. Color uniform whitish. Length (without anchor-claws) 0m.003.

#### EREBOMASTER COPE.

Genus novum, familiæ *Gonyleptidarum*. Cephalothoracic shield extending over a considerable part of the abdomen, which has seven segments. Tarsus with three joints and a terminal claw. Palpi with five joints and a claw, the fourth and fifth with a series of strong spines on each side. Man-

dibles chelate. Cephalothorax with a median conical eminence, which has an ocellus on each side of its base. Posterior trochanters like the others.

This genus is related to the *Acanthocheir* of Lucas, which has been recently figured in the Naturalist. According to Wood that genus is eyeless. Dr. Packard's figure presents many peculiarities. Thus the abdomen is not represented as segmented, and there is no distinct cephalothoracic shield; the tarsi are represented as only two-jointed. From this and other facts, I suspect that *Acanthocheir* should be placed near *Erebomaster* among the *Gonyleptidæ*.

E. FLAVESCENS Cope, sp. nov. "Opilio-like Spider," Cope, Ann. Magaz. Nat. Hist., November, 1871. Body smooth, limbs very minutely hairy. Two spines at the extremity of the penultimate tibia. Three or four spines at the base of the third segment of the palpi, not longer than those of the third, which has four on the outer side. Spines of last joint longest. The longest limbs are about twice as long as the total length of the body. Maxillæ rather long. Color a light brownish yellow. Length of head and body m.0025.

In one specimen the male organ is protruded and extends to the mandibular cheles; it is not chitinized and appears to be twice segmented. It terminates in a short point with mucro, which is flanked on either side by a point with two divergent bristles.

#### ANOPHTHALMUS STURM.

A. TENUIS Horn. Pale, rufo-testaceous, shining. Head slightly darker in color, oval and arcuately biimpressed. Thorax broader than the head, slightly longer than broad, and sinuately narrowing to hind angles, which are exactly rectangular; median line distinctly impressed in its entire length; basal impression deep; base of thorax truncate. Elytra elongate oval, feebly convex, at base slightly flattened; two-thirds longer than broad; humeri obtusely rounded, surface with feeble traces of striæ and three dorsal setiger-

ous punctures on each elytron, in or nearest to the position of the third stria. Body beneath similar in color to the upper surface, legs somewhat paler. Length .18-.24 inch; 4.5-6mm.

Three specimens of this species were collected. This species is closely allied to *A. Menetriesi* Motsch. (*angulatus* LeC.) but differs by its more elongate and less robust form and less convex surface. The elytra are smoother and with very feeble traces of striæ. The two species differ, especially in the form of the hinder thoracic angles and base of thorax. In *Menetriesi*, the angles are acute, slightly prominent externally and the base of the thorax slightly prolonged, while in the present species the angles are strictly rectangular and the base truncate. This species must be placed near the one just cited in my table of our species. (Trans. Ent. Soc., Phil., 1868, p. 126.)

The new species above described is the most slender in form of any in our cabinets.

**A. EREMITA** Horn. Pale, rufo-testaceous, feebly shining. Head oval, arcuately biimpressed, impressions moderately deep, intervening space feebly convex. Thorax wider at widest portion than long, sides moderately rounded in front, gradually narrowed to base, hind angles rectangular, base truncate and as wide as length of thorax; disc feebly convex, median line distinctly impressed, basal transverse impression moderate. Elytra oval, less shining than thorax and sparsely clothed with very short, erect pubescence; striæ obsolete; three dorsal punctures on the line of the third stria. Length .20 inch, 5mm.

One specimen of this species was collected with preceding in Wyandotte Cave. The only species with which it might be confounded is that previously described by me under the name *A. pusio*, and although differing very notably on comparison in their general aspect, the points of difference are not easily made plain in a description. The present species is in all respects broader and less depressed, without being convex as in *Menetriesi*; the thorax is broader, less narrowed behind, and the sides more rounded. The elytra are

less shining and the pubescence more distinct, although in both species the pubescence can only be observed by holding the specimen between the eye and the light and then only with a good power. In the three species at the head of my analytical table, no signs whatever of pubescence can be observed. The elytral striæ are here obliterated, faint traces are discernable only at the base. The basal margin is not prolonged.

QUEDIUS LEACH.

*Q. SPELÆUS* Horn. Pale, rufo-testaceous, shining. Head broadly oval, smooth, shining, slightly impressed between the eyes in front; two punctures bearing short setæ in front of the eyes, another at the side of the vertex, two at the side of head behind, hind angle of head slightly pubescent. Eyes not large, nearly round and prominent. Antennæ moderately stout, one-half longer than the head, first joint nearly as long as the second and third together, the third one-half longer than the second; joints 4-10, gradually but feebly stouter, cylindrical and scarcely longer than wide, joint 11, longer than preceding and subacute at tip. Thorax slightly broader than the elytra, sides distinctly explanate, broader than long, emarginate in front, anterior angles subacute, sides and base broadly rounded, forming nearly a circle, less the emargination in front; surface smooth, shining and with punctures arranged as follows: a dorsal series of two punctures moderately distant from the anterior margin, a lateral oblique series of three or four punctures, one puncture being within the line of the lateral but not belonging to the dorsal series; a marginal row of moderately large punctures close to the lateral margin extending along the base, the punctures being more distant in the latter region. Prosternal process behind the coxæ corneous. Scutellum smooth, shining. Elytra slightly longer than the thorax, rather densely and moderately coarsely punctured and sparsely clothed with yellowish pubescence. Abdomen moderately elongate, longer than the head, thorax and elytra together, slightly narrowed to apex, moderately

punctured but less densely than the elytra, above and beneath sparsely clothed with brownish hairs. Body beneath and legs similar in color to the upper surface. Length .46-.55 inch 11.5-12.5mm. Abundantly distinct from all our species by the color and thoracic punctures. The sides of thorax are more explanate than any of our species except *Q. explanatus* LeC.

Two specimens were collected a short distance within the mouth of Wyandotte Cave.

## DESCRIPTIONS OF SPECIES FROM THE MAMMOTH CAVE.

### PHRIXIS COPE.

Genus novum *Gonyleptidarum*. Cephalothoracic shield covering dorsum of abdomen, which is posteriorly segmented. Eyes none. Tarsi multiarticulate, clawed. Palpi spiniferous, maxillæ chelate.

This genus is near *Erebomaster*, differing in the multiarticulate tarsi, and absence of eyes. It is nearer to *Acanthocheir*, being like it, eyeless, but the latter, according to Dr Packard's figure (in AMERICAN NATURALIST, l. c.) has tarsi as in the first named genus, one or two jointed. In *Phrixis* they are much as in *Phalangium*, which the species also resembles in its long limbs.

PHRIXIS LONGIPES Cope, sp. nov. Legs eight times as long as the body, tarsus of the shorter with five, those of longer with six joints, those of the longest not counted. The first and second segments are very long; tibiæ shorter than femora; coxæ subglobular. Legs with scattered, rather short hairs. Last tarsal joint with one claw and an opposing bristle, in two limbs as long as femora, exceeding total of body, with two claws. Palpi five jointed, the third, fourth and fifth with large spines on each side, the second, or vertical, with four near the base directed forwards and two near the upper end directed inwards. Mandibles pubescent. Five narrow, and one terminal, segments of the abdomen,

the penultimate wider than the others. Body pubescent. Color very pale, with a straw-colored shade. Length of body 1.17 lines, or m.00225; longest leg m.02.

This species, though small, considerably exceeds the *Acanthocheir armatus* in dimensions.

STYGOBROMUS COPE.

Gen. nov. *Gammaridarum*. Near *Gammarus*. The first antennæ with flagellum, and much shorter than the second. Two pairs of limbs chelate by the inflexion of the last claw-like segment; other limbs clawed. Terminal abdominal segment very short, spiniferous; the penultimate segment with a stout limb with two equal styles, the antepenultimate short, two-jointed and undivided. Eyes none.

This genus is nearer to the true *Gammarus* than the allied genus described from the Austrian Caves, the *Niphargus* of Schiodte.\* In the latter the first antennæ are the larger, and the body terminates in a very long style; the last abdominal limb is undivided like that which precedes it. In *Stygobromus* the penultimate limb is like that represented by Schiodte for *Niphargus*, though I am not certain whether it is homologically identical. The last limb is about equally divided, but the simple basis is long and stout.

It is just possible that the antepenultimate limb represents the basis and one style only, for in that of one side a slight process appears at the extremity of the basal segment, though it is not visible on that of the other. The terminal limbs are recurved and appressed to the last abdominal segment, forming a fulcrum or prop. The animals of this genus are aquatic, and swim much as the common *Gammari*. The absence of eyes is another example of the adaptation to darkness.

STYGOBROMUS VITREUS Cope. "Gammaroid Crustacean" Cope, Ann. Mag. Nat. Hist., Nov., 1871. Two last pairs of limbs appressed to last abdominal bristles and of nearly equal length, forming a brush. Last segment of abdomen

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\*Proc. Entom. Soc., London, 1851, p. 150.

with two terminal bristles. Last segment of the limbs from the third to the seventh, with a long, straight claw directed forwards. Fringed limbs behind this point very small. Outer or second antennæ half as long as the first, which embrace eleven segments, and are about as long as the last five abdominal segments. Total length of head and body 2.1 lines or .0045m.

There are few conspicuous hairs, the most so are those which stand at the extremity of the last joint of the limbs, rising from the base of the claw. Color translucent.



ANALYSES OF COALS—PERRY COUNTY.

COUNTY.	NAME OF MINE OR OWNER.	Specific gravity.	Weight of one cubic foot.	Fixed carbon.	Ashes.	Coke.	Gas.	Water.	Total Volatile Matter.	Color of Ash.
Perry .....	Everard's Coal.....	A .....	.....	54.00	1.50	55.50	37.00	7.50	44.50	Red.
Perry .....	Rock Island seam, upper part .....	F .....	.....	52.50	2.00	54.50	41.00	4.50	45.50	White.
Perry .....	Rock Island seam, sulphurous parting .....	F .....	.....	58.00	11.00	69.50	27.50	3.00	30.50	Red.
Perry .....	Rock Island seam, lower part .....	F .....	.....	50.00	8.50	58.50	37.00	4.50	41.50	White.
Perry .....	Rock Island seam, slaty bottom .....	F .....	.....	49.50	12.50	62.00	34.00	4.00	38.00	Lemon.
Perry .....	Rock Island seam, Cannel.....	F .....	.....	45.50	6.00	51.50	42.00	6.50	48.50	White.
Perry .....	Cannelton, upper part.....	F .....	.....	51.50	4.00	55.50	41.00	3.50	44.50	White.
Perry .....	Cannelton, middle part.....	F .....	.....	48.50	2.00	50.50	43.00	6.50	49.50	Brown.
Perry .....	Cannelton, bottom part .....	F .....	.....	45.50	3.50	49.00	46.00	5.00	51.00	Red.
Perry .....	Clark Bros., upper part .....	F .....	.....	48.50	2.00	50.50	42.50	7.00	49.50	White.
Perry .....	Clark Bros., middle part .....	F .....	.....	49.50	3.50	53.00	40.50	6.50	47.00	White.
Perry .....	Clark Bros., bottom part .....	F .....	.....	48.50	4.00	52.50	41.00	6.50	47.50	White.
Perry .....	Hack's mine, upper part .....	F .....	.....	49.50	6.00	55.50	40.00	4.50	44.50	Blue.
Perry .....	Hack's mine, lower part.....	F .....	.....	45.00	8.50	53.50	43.00	3.50	46.50	Red.
Perry .....	McMahon's mine, upper part.....	.....	.....	48.50	4.00	52.50	41.50	6.00	47.50	Blue.
Perry .....	McMahon's mine, lower part .....	.....	.....	50.50	5.50	56.00	39.50	4.50	44.00	Brown.
Hancock, Ky....	Hancock mine,* upper part.....	F .....	.....	49.50	3.50	53.00	40.50	6.50	47.00	Blue.
Hancock, Ky....	Hancock mine,* middle part.....	.....	.....	45.50	4.00	49.50	45.00	5.50	50.50	Brown.
Hancock, Ky....	Hancock mine,* lower part.....	.....	.....	40.00	12.00	52.00	41.50	6.50	48.00	Liver.
Hancock, Ky....	Hancock mine,* slaty bottom... ..	.....	.....	36.50	24.00	60.50	31.00	8.50	39.50	White.

\* These mines are owned and worked by the American Cannel Coal Company, of Cannelton, Perry County.

## ANALYSES OF COALS—DUBOIS COUNTY.

COUNTY.	NAME OF MINE OR OWNER.	Specific gravity	Weight of one cubic foot.	Ash—	Coke	Gas	Water.	Total Volatile Matter.	Color of Ash.
Dubois	Burnham's coal	1.306	81.02	53.00	55.50	39.00	4.50	43.50	White.
Dubois	Elkin's coal	1.295	80.93	50.50	54.50	39.00	5.50	45.50	Brown.
Dubois	Harbison's coal	1.198	74.87	23.50	33.50	00.50	6.00	66.50	Pink.
Dubois	Hay's coal, upper part	1.289	80.56	51.50	55.00	40.50	4.00	45.00	White.
Dubois	Hay's coal, middle part	1.264	79.00	49.50	52.50	40.50	7.00	47.50	White.
Dubois	Hay's coal, bottom part	1.271	79.43	51.50	53.50	40.00	5.50	45.50	White.
Dubois	Kesler's coal, upper part	1.333	83.31	40.00	51.50	41.50	7.00	48.50	Blue.
Dubois	Kesler's coal, middle part	1.256	79.35	40.50	49.00	45.00	6.00	51.00	Gray.
Dubois	Kesler's coal, bottom part	1.260	78.75	40.50	49.50	44.00	6.50	50.50	Brown.
Dubois	Fest's coal	1.305	81.56	48.00	53.50	41.00	5.50	46.50	Fawn.
Dubois	Bridenbaugh's, upper part	1.273	79.56	52.50	50.50	37.00	6.50	43.50	Red.
Dubois	Bridenbaugh's, middle part	1.255	79.06	51.50	55.00	40.50	4.50	45.00	Red.
Dubois	Bridenbaugh's, bottom part	1.246	77.87	52.50	50.00	39.00	5.00	44.00	Red.
Dubois	Rudolph's coal	1.351	78.81	46.50	52.50	42.00	5.50	47.50	Red.
Dubois	Joe Stein's coal	1.280	78.75	48.50	52.00	43.50	4.50	48.00	Brown.
Dubois	M. Wilson's coal	1.416	88.50	53.00	55.50	40.50	4.00	44.50	White.
Dubois	M. Wilson's coal, (another part of the mine)	1.390	80.37	44.50	49.50	44.50	6.00	50.50	Red.
Dubois	Adam Smith's, upper part	1.350	78.50	43.50	47.00	45.00	7.00	53.00	White.
Dubois	Adam Smith's, middle part	1.335	83.43	49.00	51.50	43.50	5.00	48.50	White.
Dubois	Adam Smith's, bottom part	1.301	78.41	44.50	49.00	45.50	5.50	51.00	Gray.
Dubois	Bretsville coal	1.275	79.48	49.00	58.50	48.00	4.50	47.50	White.

## ANALYSES OF COALS—PIKE COUNTY.

COUNTY.	NAME OF MINE OR OWNER.	Specific gravity.	Weight of one cubic foot.	Fixed carbon.	Ashes.	Coke.	Gas.	Water.	Total Volatile Matter.	Color of Ash.
Pike.....	Thomas Case's Coal.....L?	1.280	80.00	46.50	4.00	49.50	47.00	3.50	50.50	Fawn.
Pike.....	Bennett's Coal.....K	1.268	79.25	46.50	3.50	49.00	45.00	6.00	51.00	Brown.
Pike.....	Alexander's Coal.....N	1.284	80.25	49.50	3.00	52.50	41.50	6.00	47.50	White.
Pike.....	Alexander's, another part of the seam.....N	1.259	78.69	52.00	4.00	54.00	36.00	8.00	44.00	White.
Pike.....	Dr. Posey's, upper part.....K	1.288	80.50	48.00	5.50	53.50	40.00	6.50	46.50	Blue.
Pike.....	Dr. Posey's, middle part.....K	1.276	79.68	48.00	4.00	52.00	41.00	7.00	48.00	Fawn.
Pike.....	Dr. Posey's, bottom part.....K	1.244	77.75	50.50	6.00	56.50	38.00	5.50	43.50	Brown.
Pike.....	Shandy's, upper part.....K	1.279	79.94	51.50	5.00	56.50	37.00	6.50	43.50	White.
Pike.....	Shandy's, lower part.....K	1.270	79.37	49.00	3.50	52.50	41.50	6.00	47.50	White.
Pike.....	DeBruler's, upper part.....K	1.294	80.87	42.00	5.00	47.00	45.00	8.00	53.00	Blue.
Pike.....	DeBruler's, middle part.....K	1.271	79.43	44.50	5.50	50.00	44.00	6.00	50.00	Brown.
Pike.....	DeBruler's, bottom part.....K	1.268	79.25	50.00	3.50	53.50	49.00	6.50	46.50	Blue.
Pike.....	Crowe's, upper part.....L	1.274	79.62	52.50	3.50	56.00	35.50	8.50	44.00	Fawn.
Pike.....	Crowe's, lower part.....L	1.262	78.87	47.90	8.50	56.40	35.10	8.50	43.60	Gray.
Pike.....	T. Smith's.....N	1.279	79.93	53.50	2.50	56.00	38.50	5.50	44.00	White.
Pike.....	Hawthorn & Gleason's.....L	1.269	79.31	45.50	14.00	59.50	32.00	8.50	40.50	Gray.
Pike.....	Barr's .....M	1.260	78.76	57.00	3.50	60.50	32.50	7.00	39.50	White.
Pike.....	Fall's, upper part.....N	1.274	79.62	47.00	5.00	52.00	42.50	5.50	48.00	Fawn.
Pike.....	Fall's, lower part.....N	1.268	79.25	51.50	4.00	55.50	37.00	7.50	44.50	White.
Pike.....	Owner unknown.....K	1.268	79.25	48.00	3.00	51.00	44.50	4.50	49.00	White.

## ANALYSES OF COALS—PIKE COUNTY CONTINUED.

COUNTY.	NAME OF MINE OR OWNER.	Specific gravity.	Weight of one cubic foot.	Fixed Carbon.	Ashes.	Coke.	Gas.	Water.	Total Volatile Matter.	Color of Ash.
Pike	De Tar's coal, upper part.....A	1.444	90.25	41.50	14.00	55.50	37.00	7.50	44.50	Red.
Pike	De Tar's coal, lower part.....A	1.286	90.50	49.50	5.00	54.50	40.00	5.50	45.50	Red.
Pike	Bee's coal.....K	1.399	79.31	44.50	14.00	58.50	37.00	4.50	41.50	Brown.
Pike	Moulton's coal, upper part.....K	1.944	77.50	48.00	9.50	51.50	43.00	5.50	48.50	Blue.
Pike	Moulton's coal, middle part.....K	1.257	78.56	50.50	3.50	59.00	36.50	4.50	41.00	Red.
Pike	Moulton's coal, bottom part.....K	1.257	78.56	49.50	3.00	52.50	41.50	5.00	47.50	White.
Pike	Thomas' coal.....K	1.290	80.00	48.50	4.00	54.50	40.50	7.00	47.50	White.
Pike	Wells & Whitman, upper part.....L	1.294	80.87	52.50	2.50	55.00	37.00	8.00	45.00	White.
Pike	Wells & Whitman, middle part.....L	1.278	79.87	50.50	2.00	58.50	41.50	5.00	47.50	White.
Pike	Wells & Whitman, bottom part.....L	1.275	79.68	50.50	2.50	53.00	42.00	5.00	47.00	White.
Pike	Masey's, upper part.....L	1.288	78.25	53.50	5.50	57.00	34.50	8.50	43.00	Gray.
Pike	Masey's, bottom part.....L	1.279	79.93	55.00	1.00	54.50	38.50	7.00	43.50	White.
Pike	Martin's, upper part.....L	1.256	78.02	52.00	3.50	55.50	37.00	7.50	44.50	Gray.
Pike	Martin's, middle part.....L	1.309	79.31	57.00	2.00	63.00	33.50	5.50	40.00	Gray.
Pike	Martin's, bottom part.....L	1.875	79.68	53.00	2.50	57.50	35.00	7.50	42.50	White.
Pike	Tevault's.....K	1.245	77.81	40.50	3.00	52.50	40.50	7.00	47.50	White.
Pike	Wood's.....K	1.273	79.50	46.00	3.00	49.00	47.50	4.50	52.00	White.
Pike	Ingham's, upper part.....K?	1.290	80.00	40.00	9.00	51.00	41.50	7.50	49.00	White.
Pike	Ingham's, lower part.....K?	1.311	81.03	50.50	3.00	59.50	41.00	8.50	47.50	White.

## ANALYSES OF COALS.

COUNTY.	NAME OF MINE OR OWNER.	Specific gravity.	Weight of one cubic foot.	Fixed Carbon.	Ashes.	Coke.	Gas.	Water.	Total Volatile Matter.	Color of Ash.
Parke .....	Sand Creek coal.....	1.266	81.00	45.50	4.50	50.00	45.50	4.50	50.00	Light brown.
Parke .....	Beard's coal.....	1.191	74.43	48.50	1.00	49.50	42.50	8.00	50.50	White.
Lawson .....	Rockeye Cannel Coal Company, Cannel coal.....	1.223	76.87	42.00	8.00	48.00	48.50	3.50	52.00	White.
Sullivan .....	Henry K. Wilson's mine .....	1.223	76.75	51.50	0.80	52.50	45.25	2.35	47.60	White.
St. Joseph .....	Peat from Notre Dame .....	.....	.....	20.50	9.50	36.00	15.50	2.50	54.00	Yellow.
Spencer .....	H. B. Klitsen's coal .....	1.244	77.75	46.50	2.00	48.50	47.00	4.50	51.50	White.
Spencer .....	Kathman's coal, upper part .....	1.250	78.12	45.50	2.00	47.50	48.50	4.00	52.50	White.
Spencer .....	Kathman's coal, lower part .....	1.261	78.15	47.50	2.50	50.50	45.00	5.00	50.50	White.
Spencer .....	Abbott of St. Meinrad .....	1.245	79.06	50.50	5.00	55.50	39.00	5.50	44.50	Brown.
Parke .....	Bethany, Cannel coal .....	.....	.....	43.00	4.50	47.50	47.00	5.50	52.50	White.
Sullivan .....	Curryville,* upper part .....	.....	.....	56.50	2.50	59.00	34.50	4.50	41.00	White.
Sullivan .....	Curryville, middle part .....	.....	.....	53.50	1.50	55.00	40.00	5.00	45.00	White.
Sullivan .....	Curryville, bottom part.....	.....	.....	52.50	2.00	55.50	40.00	4.50	44.50	White.

\*Bottom seam.

*ULTIMATE ANALYSES OF COALS.*

NAME OF MINE OR OWNER	Ash.	Carbon.	Hydrogen	Nitrogen.	Oxygen.	Sulphur.	Heat Units.
Sand Creek coal, Parks county.....	4.71	76.38	4.71	1.33	12.32	.....	7306
Sand Creek coal, another specimen.....	3.19	77.03	5.80	1.54	12.64	.....	7809
Buckeye Cannel Coal Company, Devils county.....	7.65	71.10	5.06	1.45	12.74	1.00	7304
Henry E. Wilson's mine, Sullivan county.....	1.88	84.08	5.51	1.90	11.45	1.00	9004
Peat from Notre Dame, St. Joseph county.....	9.50	39.10	4.90	.....	34.00	.....	8203
Garlick & Collins, Clay county, No. 1.....	2.86	76.61	4.13	1.73	12.90	.50	7406
Garlick & Collins, Clay county, No. 2.....	1.07	83.70	4.77	1.62	9.39	.45	
Star Mine, Planet Furnace, Clay county, No. 1.....	2.74	80.74	5.51	1.67	8.60	.73	9323
Star Mine, Planet Furnace, Clay county, No. 2.....	2.74	81.60	4.39	1.67	8.37	.73	
Clay Coal Company's mine, Clay county.....	1.88	84.68	4.10	1.36	7.68	.60	9026
Rock Island Coals, upper part, Perry county.....	3.00	79.94	4.61	1.15	12.80	.....	7513
Rock Island Coals, average, Perry county.....	9.50	75.40	4.45	0.96	9.70	.....	7353

COALS TESTED FOR ILLUMINATING GAS.

NAME OF MINE OR OWNER.	Cubic feet of Gas per Pound.	Pounds of Coke.	Carbonic acid and Sulphur.	Water.	Tar and Ammoniac. Liquor.	Candle Power of Gas.
Pioneer Shaft, Curryville, Sullivan county.....	3.68	.575	.015	.025	.07	15
Pioneer Shaft, Curryville, Sullivan county, second trial.....	3.61	.625	.075	.025	.01	15
H. K. Wilson, Sullivan county.....	3.95	.675	.....	.....	.05	15.7
Rock Island Coal, Perry county, top of seam.....	3.41	.625	.050	.025	.15	.....
Rock Island Coal, Perry county, middle of seam.....	3.50	.725	.025	.....	.25	.....
Rock Island Coal, Perry county, bottom of seam.....	2.62	.625	.....	.....	.15	.....
Rock Island Coal, Perry county, average of seam.....	3.18	.620	.050	.025	.12	.....
Rock Island Coal, Perry county, coal rash.....	3.41	.625	.....	.05	.....	.....

PROFESSOR E. T. COX,  
*State Geologist of Indiana :*

DEAR SIR : Herewith I submit my report on the Geology  
of Dubois and Pike counties.

With acknowledgements due to you for information, assist-  
ance and many acts of courtesy,

I am yours, etc.,

JOHN COLLETT.

EUGENE, INDIANA, October 10, 1872.





# G E O L O G Y

OF

## DUBOIS COUNTY, INDIANA.

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Dubois county, Indiana, is bounded on the north by Daviess and Martin counties, on the east by Orange and Crawford, on the south by Perry, Spencer and Warrick, and on the west by Pike; embracing an area of four hundred and thirty-two square miles.

Of this area, about one-tenth is river and creek bottoms, occasionally subject to inundation; one-half modified drift and alluvion of ancient lakes and rivers, the remainder bold hills and elevated plateaus and knolls, underlaid by the conglomerate sandstone.

The surface varies from high hills, on the east, to gently rolling or level plateaus in the southern, southwestern and northwestern parts.

The county is abundantly supplied with water. The east fork of White river chiefly forms the northern boundary, and Patoka river flows from east to west through the center. These, with their numerous branches, ramify into all parts. Many springs flow out at the junction of the alluvium and recent drift with the older deposits, and at outcrops of impervious strata accompanying coal seams.

## RECENT GEOLOGY.

The surface deposits of Dubois county consist of clays, slightly intermixed with gravel, or pure, of the glacial drift, and loess with the subsequent lacustrine and alluvial deposits.

The *alluvium* of the river and creek bottoms is an accumulation due to causes now in action, and it is formed from the decomposition and intermixture of sedimentary material from all the older rocks; hence its friability and great fertility.

At a height of from one hundred and ten to one hundred and twenty-three feet above the present low water of White river, on alternate sides and opposite to great curvatures in the general trend of the valley, other ancient alluvial deposits are found—"sand-bars," dating back to the long past, yet as easily identified as the "bars" which mark the "bends" of the present river. Conspicuous examples may be seen east of Haysville, on "Harbison" farm, west of Haysville, at Portersville and many other points in Daviess and Pike counties. It is evident that the *ancient* river was subject to the present laws of flowing water. Gravel and boulders torn from the most obdurate rocks toward its source formed shallows and obstructions (rapids) then as to-day. One of these ancient riffles, represented by a *bed of geodes* from the mountain limestone of Orange and Lawrence counties, is seen on the hill in the west part of Haysville. A similar bed was noticed on the road to Jasper, south of Portersville, both indicating the wide range traversed by this stream before the present valley was excavated.

*Lacustrine deposits* are found when digging wells in the level plateau in the northwest part of the county, between Ireland and Otwell. They consist of clays and impalpable intercolations of silicious material, occasionally interrupted by thin layers of quicksand. Near the base of these beds are found remains of shrubs and grape vines of enormous growth, indicating, perhaps, the luxuriance of a warmer clime.

*The Loess* caps the highest hills of the county. Where

undisturbed it is a brown loamy sand, imperfectly stratified, twenty to thirty feet in thickness. Rich in plant-food, it is noted as the "*walnut level*." We here find on the highest hill-tops, a growth of timber and plants usually limited to the warm loams of the bottoms; as Walnut, Sugartree, Wild Cherry, Spice Wood, Pawpaw and Bluegrass. Examples may be seen at Harbison's walnut grove, east of Haysville, and near Birdseye.

The greater portion of the loess has, in the course of ages been eroded or modified. The soluble ingredients have been removed, while the residual ash-gray sands and clays are left deposited like a sheet of snow covering the hill sides, and partially filling valleys formed previous to the glacial period. The Patoka river has the features\* characteristic of streams flowing through loess deposits. The bluffs slope gently down to the valley "bottoms;" these are of much greater width (ranging from one to three miles wide) than would be expected from the present size of the stream. The soil is cold and impervious to moisture; hence very wet in winter and very dry in summer. The usual timber on these bottoms is Elm, Water Maple and Gum; occasionally a choice tract of sandy bottom, but rare indeed, will exhibit a fair growth of Beech, Sugar, Overcup Oak and Poplar.

The plastic nature of modified loess, covering all the older deposits, and hiding from view the ancient bluffs and valleys, renders difficult the work of the geologist, especially in a county like this where remoteness from lines of commercial transit gives no incentive to local mining.

*The Boulder or Glacial Drift* is the next in age. It consists of blue and white plastic clays spread out over a system of hills and valleys excavated previously or during an early period of the glacial era. Commencing in the southern part of the county with a depth varying from a few inches to nearly one foot, it gradually thickens toward the north; and along White river it attains a depth of eight feet, with

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\*See White's Geology of Iowa.

a slight intermixture of gravel not exceeding half an inch in diameter. When exposed to the surface, the lower member of the drift is sometimes mistaken for a fire clay. It will furnish good potters' clay for common crockery.

#### **PALEOZOIC GEOLOGY.**

The stratified rocks of this county belong mainly to the coal measures, with a limited exposure of subcarboniferous or mountain lime-stone, in the deep gorges of the head waters of the Patoka river. The entire area of the county is underlaid by coal, excepting only the highlands commencing a short distance north of Birdseye and extending to the northern boundary. Even in this area, occasional out-liers will be found on the hill tops, but of no great extent.

The following general section taken at different points will give a connected exhibit of the coals and rocks.

GENERAL SECTION.

COMMENCING AT THE HILL NORTH OF JASPER.

SPACE.		FT.	IN.	
21.		2 — 10		Soil.
		10		Shaly sandstone.
		1		Black slate.
1.4		1	4	CUAL M.?
20.3		2	3	Fire clay.
		18		Siliceous shales, part sandstone.
		1	8	COAL I.?
67.		9		Fire clay with iron nodules.
		40		Siliceous shales and covered.
		1 — 10		Hard flinty limestone.
		2 — 8		Black slate with iron concretions.
		2	10	COAL K with 2 inches sulphur band.
2.10		1	6	Fire clay, plastic.
		3		Fire clay, hard.
		22		Laminated and ferruginous sand rock.

GENERAL SECTION—Continued.

SPACE.		Ft.	In.	
		48 —110		Massive conglomerate.
		24—	2	Gray siliceous shale.
		0—	10	8 Calcareous shale.
		0—	2	2 Bituminous shale.
4		1—	4	COAL A, part block coal.
			1	2 Dark bituminous clay.
			3	Blue clay shale.
			7	{ Siliceous shale with carbonaceous partings.
			2	2 Bituminous clay shale.
				9 COAL, rash.
			1	6 Shaley fire clay.
			4	Clay shale with iron nodules.
		10		Archimedes limestone.
79.1		50		Oolitic limestone.
339.	Total.			

RECAPITULATION.

SPACE.		Ft.	In.	
		21		Space.
		1	4	COAL M?
		20	3	Space.
		1	8	COAL L?
		67		Space.
		2	10	COAL K.
		141	4	Space.
		4		COAL A.
		79	7	Space.
	Total.	339		



## COAL L AND M.

The division in the foregoing section, from the shaly sandstone to the fire clay inclusive, includes the strata accompanying two small seams of coal on the hill in the northern part of Jasper, the county seat. Although isolated by surrounding valleys, they probably represent coals L and M, here thin and intermittent on account of proximity to the rim of the basin. These seams have been worked by stripping at this point, and thence westerly and northwesterly, toward the neighborhood of Ireland, they are seen at frequent outcrops at the hill tops, and near the surface in the table lands. In all this region, L and M do not attain a thickness sufficient to justify mining, and are of interest only as a horizon from which to estimate the distance, fifty to sixty feet, down to coal K. Observations made in Pike county indicate a probability that near the county line, a few miles southwest from Ireland, coal L may be found not far from the surface with a thickness of three and a half to four feet.

The silicious shales, number eight of the section, often change into flaggy sandstones, and are generally accompanied by a stratum of solid sand rock from two to five feet thick. Leaves and stems of the coal plants *Neuropteris*, *Pecopteris*, *Alethopteris*, *Asterophyllites*, *Flabellaria* (?) and *Cordaites* were found in the shales of this bed, in the rocky layers; trunks of *Sigillaria*, *Calamites* and *Lepidodendron* are often preserved as casts of wonderful beauty and exactness of detail. This layer furnishes good material for foundations and hammered masonry.

Coal K, of the general section, and the strata, which almost invariably accompany that seam, constitute a marked horizon. Commencing on White river at the north, these strata gradually but irregularly ascend to the summit of this ridge, dividing the waters of White river from those of the Patoka, and then descend to the trough through which flows the latter stream. Thence to the south and east, they mount the conglomerate ridges, often at the rate of 50 feet to the mile, and

after passing the summit of the divide, (now cut through by Hall's creek, Strait creek and Hunley's creek,) these strata again descend to near the level of the stream, flowing into the Ohio near the southern line of the county. Some of these companion deposits may be absent or not visible, but the appearance of one or more will generally enable the observer to determine with reasonable exactness the position or *place* of the missing series. Thus in the valleys or basins these rocks are generally *all* well developed in regular succession, but as we ascend the sandstone ridges, south, east and north-east from Jasper, and *especially* as we approach the rim of the coal basin, they become thinner. First the coal disappears, then the bituminous shale is no longer found, and finally, high on the hill tops, out-liers of K are seen, if we may use such a contradictory expression, represented the by notable fire clay and the flinty limestone roof, but all the carbonaceous material which usually lies between them entirely missing, never having been deposited at these points.

These facts in relation to coal K, and similar observations in relation to the final outcrop of other seams in this vicinity establish, as it seems to me, lines which limit the carbonaceous deposits of each particular seam—fixes an absolute margin to our coal measures, and bears damaging testimony against the theory heretofore advanced, that "the Indiana and Ohio coal fields were once connected by continuous deposits of coal over the central and eastern parts of this State, since removed by denudation."

The internal evidence recorded by either the coal or the limestones considered separately is no less unorthodox, and shows facts which can scarcely be harmonized with the adopted "bog or swamp" theory for the deposition of coals and coal measure limestones. The latter, in the western part of the county, is generally bituminous, sometimes argillaceous, but often so pure as to admit of being burned for lime. Like other coal measure lime rocks it is filled with fossil shells and casts of animals, which are exclusively of marine origin. Prominent among these are the remains

of the gigantic fish *Edestus vorax* (Leidy), chambered shells as *Orthoceras*, *Nautilus*, etc., etc., of great size, *Spirifers*, *Pleurotomaria*, etc.; all of which, either from peculiar adaptation of form, as the chambered shells, or from delicacy of structure such as the minute ornamentation of the *Pleurotomaria* and the fragile tenderness of the spined *Productis*, indicate a home in the profound and quiet depths of a central ocean, remote from the influence of waves as well as from rocky or sandy bottoms, until some mighty current of disturbed and muddy waters impelled by earthquake action overwhelmed these animals—the impure water putting an end to their life, and burying them in the slimy bed deposited over the coal material. At Jasper, and easterly toward the rim of the basin, this limestone becomes more silicious, occasional fossils, battered and worn by long transportation, are found, which belong to the epoch of the subcarboniferous lime rocks, but coal measure fossils predominating.

Still further east, the silicious matter increases. Masses and bands of flints are found imbedded in this stratum until finally the flints predominate over or take the place of the former rock. Here are found some worn fossils belonging to the coal measures; but with many strictly characteristic of the subcarboniferous age, as *Pentremites* (worn) and their stems, Crinoid stems, plates and arms, and highly ornamented plates and spines of *Archæocidaris*; these last so well preserved as to exhibit the minutest details of ornamentation. Now, these animals, whose home is known to be in the shallow seas which laid down the mountain limestone, could not have lived here. They must have been transported at the time of their death from areas suited to their mode of life, still further to the east, and leave the inference that the seas which sustained these animals of the subcarboniferous age existed within a distance of five to ten miles, at a higher level and contemporaneously with the deposit of coal K. These facts I have not seen noticed elsewhere. I submit them for consideration, and am alone responsible for the heresy, if they prove heretical.

Again, coal K, in the valleys and basins of lower level, is

usually from two and a half to three feet thick. In the western part of the county, it is generally a caking coal. At the center, it is about one-third block coal, the balance caking or semi-block. At some localities, the block coal is in the middle of the seam, at others, within a distance of a few miles; the block coal may be either at the top or bottom, the caking stratum interchanging with it. While caking coals are generally referred to bogs and the peat of swamps for their origin, the accepted theory for the formation of cannel and splinty coals, is that the vegetation from which they are constituted, was first macerated for a long period in sea water, until pulpified and then cast down. This theory is reasonable, and is sustained by the fact that often in such cannels are found the most solid remains of marine animals, as scales, teeth and spines of *Petrodus* and other fishes. We can hardly conceive of a swamp of such versatility of character—so flexible in its nature, as to allow changes of level during the time necessary for the deposit of a single thin seam of coal, sufficient to make these phenomena accord with Lyell's theories. The situation would demand dry land swamps, and sea water deep enough to float fishes from twenty to forty feet long, to interchange with bewildering frequency and with reckless disregard of their order of occurrence. I do not hesitate to question the correctness of Lyell's plan and to believe that theories must be adopted, locating the area of coal deposit in the deep waters of a central ocean.

Returning to the general section, a coarse, black sulphurous slate, with pyritous iron balls, or "bowlders" as they are locally called, is a persistent companion to coal "K." It ranges in thickness from two to eight feet, and occasionally is highly bituminous and free from sulphur. The iron balls or pyritous bowlders are almost invariably present, wedged in the slate near its base. They are highly fossiliferous, containing a few fragments of coal plants, but more generally shells and marine animals. From one of these, broken up at Ingham's bank, in the northeast corner of Warrick county, besides more than

twenty species of shell fish, Dr. Rust, of Holland, found a fish bone, some eight inches long, in which was inserted a row of large saw-edged teeth. This fossil has until lately been figured and described as the jaw and teeth of a fish of the shark family of great size, under the name of *Edestus Vorax*, Leidy. Professor Cope, who is an unquestioned authority, unhesitatingly unites with Professor Worthen, in the opinion, that this determination is a mistake; that it is not a jaw-bone and teeth, but that it is the dorsal or caudal armature of a ray fish. This would indicate an animal of great size. The boulder itself was filled with shells, bones, teeth and sulphurous matter, exhibiting just such a preponderance of animal remains as is found to constitute the coprolites often seen in these shales. It is well known that such coprolites are often the nuclei around which the nodules\* and iron balls in the coal measures are formed; but this boulder, and its companions, were homogeneous in their texture. The whole rock must be referred to the same origin. If part was coprolitic, the whole was coprolitic as well. If so, we have in these boulders a hint possibly pointing them out as the excreta of wonderful monsters endowed with power and capacity to destroy and digest the gigantic *Edestus* and similar animals. The survey is indebted to Dr. Rust, of Holland, the finder, and Dr. Wellman, of Jasper, for this unique specimen of *Edestus*. Figures pretty well representing it may be seen in Geological Survey of Illinois, vol. iv, page 350. Three other specimens have been found: one in Illinois, one in Posey county and another in Parke county, Indiana; all in the bituminous roof shales of coal.

Seam "K," of the general section, underlies near two-thirds of the western part of the county, it varies in thickness from two to four feet, averaging two feet and a half. Generally it is a caking coal; but, toward the eastern margin, it becomes more or less splinty, and at some localities wholly block coal. Sections hereafter given will show details of this seam in different parts of the county. The supply will be found abundant for home consumption with

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\* See Dana's Geology.

considerable amounts for exportation if the railway facilities now proposed are ultimately supplied.

The under clays, lying immediately below the coal, are the ancient soil on which the plants rested and lived, which produced this mineral fuel, and whose rootlets (*Stigmaria*) are seen traversing the clay in every direction; it is generally silicious, and would furnish a fair to good article of fire clay. At other points, as the summit of the sandstone hills, a few miles southwest from Jasper, and at Beeler's hill near Huntingburg, this clay is more aluminous, offering a choice plastic clay, well adapted for queensware potteries. The soft laminated sandstone, number fourteen of the section, varies in thickness from ten to fifty feet, and averages about twenty-two feet. Sometimes it changes into a silicious soapstone as at Huntingburg, and occasionally into thin bedded quarry sand rock; but generally it is constant in its characteristics, with a strong tendency to disintegrate. On the higher levels, this stratum is the horizon at which a sheet of water percolated through the porous sandstone, or sand bed, dissolving and taking up the ferruginous constituents, which we now find deposited as iron ore on the brow and sides of the conglomerate hills. These sands probably formed at that era a bluff margin, either to a basin of ordinary water, or else to a basin of waters of a particular specific gravity near whose surface the mineral was deposited.

The massive conglomerate sandstone comes next in the section. It is a prominent feature in the eastern side of the county. Like a massive wall it encloses the true coal basin. From the sides of this wall several spurs are thrown out, one of which continues entirely across the county from east to west, south of Patoka river. This deposit may be characterized as a coarse-grained, ferruginous, massive or heavy bedded sandstone. Occasionally, the upper beds are filled with small pebbles of quartz, jasper, etc., relics of some older age of the ever changing earth's existence. Generally the pebbles, which give the name *Conglomerate* to the forma-

tion, are absent; and, at some rare stations the rock is soft and fine-grained.

Hills from two to four hundred feet in hight, alternate with deep narrow valleys cut out by the wear of small creeks or springs, and which are often bounded by precipitous or overhanging sides. Crevices, now filled with clays and fragments from above, were seen piercing the rock from the top to a depth of more than one hundred and fifty feet, yet hardly exceeding one or two feet in width. Good examples of this kind were also seen at Shoals in Martin county, and at "High Rock" in Daviess county. For their origin we must look to oscillations in the earth's crust—a gentle earthquake parting. They were probably the primal agency which called into existence many of the valleys and gorges which so often cross the ridges and spurs of this rock in a straight line, utterly disregarding the level of the adjoining table lands.

From the coarseness of the materials (coarse sand and pebbles) we know that the Conglomerate was borne to its place of deposit by strong currents of water, and, from false bedding of the strata, that the current was subject to changes of direction, by erosive cross-currents. In these waters floated many of the coal plants. The leaves and delicate plants were worn or destroyed by the angry waves; but trunks of *Sigillaria*, *Stigmaria*, *Lepidodendron* and *Ulodendron* are common, the casts sometimes preserving their beautiful markings with wonderful delicacy. At some points balls, cylindrical rolls, and pellets of coal were observed near the base of this rock; showing that coal material, perhaps, torn from some regular seam while yet soft and plastic, had been rolled along with the moving water until moulded by its action into the forms most likely to be produced by such a state of affairs, then bedded down, to be changed to coal by pressure and time.

Just beneath the massive sand rock, the gray silicious shales, of the section, are found varying from two to twenty-four feet in thickness. Carbonaceous and pyritous partings, and plant remains abound. On

exposure, this shale decomposes, rendering the stratum friable, and forming soluble salts. This material is carried away by the creeks and winter torrents, while the massive rock above remains. Thus are formed the "rock houses," and "pot houses" so frequently seen in this region.

The calcareous shales sometimes changing into limestone, are pretty constant, but sometimes absent. Generally shaley and so unimportant as to scarcely merit notice, yet when hardened into lime rock they form a notable feature. On King's farm, near Birdseye, this limestone is largely thickened up, and underlying shales come in of considerable depth. This, and a few other exposures noticed near Schnellville, and in the southeast part of the county, are exceptions to the general rule.

Coal A, of the section, is almost invariably capped with a black, highly bituminous slate, generally inclosing some pyritous iron stones. Small developments of cannel coal were occasionally noticed in this slate; and, although not thick enough at any of the exposures to be of practical value, yet, from the existence of this kind of coal at neighboring localities in Daviess, Pike and Perry counties, we may expect its discovery hereafter in valuable bodies. Seam A, under-runs the whole county, except the highest conglomerate ridges on the eastern border. It varies in thickness from one to four feet, averaging about one foot and two inches. A reference to the Chemist's report will show that it is rich in carbon. This tends to equalize the fuel value of this with thicker seams; for it will be found more economical to mine the same amount of combustible material (carbon) from a thin seam than from one of much greater size. The coal is compact, generally splinty, of vitreous lustre, conchoidal fracture and so free from charcoal dust as to make it pleasant and desirable for parlor use, as well as for that of the iron master.

At a distance of from twelve to eighteen feet below, a thin seam of brash coal was seen at several exposures. It is not persistent, and was not found to exceed nine inches in thickness, and often a mere trace. When the materials



from the Blue clay shale to the clay shale with iron nodules inclusive, are absent, they have been eroded, by currents of sufficient power to transport the coarse sands which now replace these strata with heavy sand rock at a few localities, and form the base of the conglomerate.

The subcarboniferous or mountain limestone county is exposed in this county only along the streams. The head waters of Patoka have cut their deep, narrow valleys through the conglomerate, bringing to view the underlying rocks on Davidson's creek, Cane creek, Lick fork, and Patoka river. Quarries have not been opened in this bed, and the precipitous sides of the valleys are generally covered with fragmentary debris from above, so that good sections could not be obtained. No well preserved fossils were found, but the spirally-turned stems of *Archimedes*, with *Pentremites* of several species, were common in the upper member (number 27 of the section.) Below, some fifty feet of light colored oolitic stone was seen, which furnishes choice white lime. As usual, large springs burst out from these rocks, some of which are accompanied by a great volume of cold air, indicating a cavernous opening within the hill. A notable example on the Burton farm, section 22, township 1 north, range 3, is worthy of a special mention.

In the foregoing discussion of the general section, I have given a summary of the geology of this county sufficiently complete for the requirements of the student and general reader. To this will be added sub-sections from different parts, selected as most characteristic of each particular neighborhood, giving details for local information.

#### LOCAL DETAILS.

That part of the general section commencing at the sandstone, below coal K, and measuring up to the highest known strata, was taken in the town of Jasper, and on the hill to the north. A repetition is unnecessary. Coal K here averages two and a half feet in thickness, and is

fully one-half block coal. It has long been worked for local use, but, for want of transportation, to no greater extent. Samples comparing favorably with the Clay county coals were selected for the State Cabinet. The upper seams L? and M? have been worked by stripping. They are also found in the hills west of town, and north on the Portersville road. Along the road to, and at Ireland, several outcrops either of the coals or of their more enduring under-clays were observed. Near their final outcrop the coals are here thin, as well as impure, and will never probably be found to be of any practical value. Many of the under clays are highly plastic, and would furnish good potters' clay.

West of the thriving village of Ireland, for miles, a perfectly level plateau of ancient lacustrine alluvium is spread out, which covers the lower workable coals. This plateau, one hundred and twenty feet above White river, is walled, on the side towards the north by gentle bluffs, often of sand, from twenty to twenty-five feet above its level, analogous to the "coast" or levee embankment of the Mississippi, for the ancient river which once flowed here.

Going south, seam K is reported visible at low water on Egg's land, southwest quarter section 35, township 1 south, range 5, of a good quality, splinty fracture, and three to three and a half feet thick. The bank was not opened. This was also the case as to coals reported three feet thick on Kato's and Heif's land. South of Jasper, at Gerber's, near center of section 1, township 2 south, range 5, considerable coal has been mined for blacksmiths' use.

## SECTION AT GERBER'S.

Soil.....	.....
Sandstone.....	12 ft. 0 in.
Shaly sandstone.....	4 ft. 0 in.
Limestone with flints.....	2 to 3 ft. 0 in.
Calcareous shale.....	1 ft. 2 in.
Black bituminous shale.....	1 ft. 0 in.
Silicious and pyritous shale.....	2 ft. 6 in.
Coal K.....	2 to 3 ft. 6 in.
Fire clay.....	.....
<hr/>	
27 ft. 2 in.	

The coal was not being worked, only weathered samples could be obtained; and these were rather too sulphurous for comfortable use. The limestone above K, is interrupted by layers of flint from two to five inches thick. Attempts to burn for lime have consequently failed.

Descending the Patoka, at Spaur's mill, banks have been opened, and also on the land of A. Smith. This coal, judging from weathered specimens, is a fair caking coal, and is three feet ten inches thick.

At Keshner's mill, northeast quarter, section 18, township 2 south, of range 5, the strata are thrown up, showing the heavy bedded sandstone above the conglomerate near the water level. Fifty feet above, the limestones accompanying K, are seen on the hillside in great blocks or heavy bands.

## SECTION AT KESHNER'S MILL

Limestone with <i>Productus semireticulatus</i> , <i>P. punctatus</i> , <i>Spirifer cameratus</i> , <i>Athyris subtilita</i> , <i>Pinnæ</i> and Crinoid stems.....	8 ft. 0 in.
Covered.....	20 ft. 0 in.
Coal K.....	2½ to 1 ft. 0 in.
Fire clay.....	4 ft. 0 in.
Soapstone with iron nodules.....	2 ft. 0 in.
Silicious shales and sandstone.....	16 ft. 0 in.
Laminated and heavy bedded sandstone.....	12 ft. 0 in.
Patoka river.....	.....
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63 ft. 0 in.	

Near by, in sections seven and eighteen, obscure outcrops of K were noticed in the beds of branches, but without opportunity of measurement. A very choice specimen of gas coal was picked up in a branch on the Green farm.

On Samuel Dillon's farm, sections five and eight, same town and range, coal has been mined to supply demands for grate and blacksmiths' use; and the well developed limestone has supplied the local market with lime, quantities of which was being used in building the new Catholic church at Jasper. With much difficulty the following section was obtained:

#### SECTION AT S. DILLON'S.

Covered.....	50 ft. 0 in.
Sandstone and silicious shales.....	20 to 30 ft. 0 in.
Limestone with <i>Productus punctatus</i> , <i>P. semireticulatus</i> , <i>P. costatus</i> , <i>Spirifer cameratus</i> , <i>S. lineatus</i> , <i>Athyris subtilita</i> , <i>Myalina</i> , <i>Discina</i> , <i>Cyrtoceras</i> , <i>Nautilus</i> , <i>Conularia</i> , <i>Pleurotomaria</i> , <i>Macrocheilus</i> , <i>Pecten Indianensis</i> , and Crinoid stems.....	8 ft. 0 in.
Covered and sandstone.....	15 ft. 0 in.
Gray and blue silicious shales.....	12 ft. 0 in.
Coal K:	
Semi-block.....	9 in.
Good block.....	8 in.
Caking.....	1 ft. 4 in.
	<hr/>
	2 ft. 9 in.
Dark fire clay.....	5 ft. 0 in.
	<hr/>
	122 ft. 9 in.

Coal on section six, immediately west, Mr. Rothert reports as being two feet thick, and as burning entirely up, leaving but a small quantity of pure white ash.

Going north to White river, coal K has been worked at McCain's and Alcorn's in sections thirty-six, twenty-five, twenty-six, and at Lemmon's, section twenty-four. It is of fair quality, but somewhat sulphurous.

## SECTION NEAR MCCANE'S, TOWNSHIP 1 NORTH, RANGE 6.

Cherty limestone.....	8 to 10 ft. 0 in.
Thin bedded sandstone.....	12 ft. 0 in.
Silicious shale.....	3 ft. 0 in.
Soft bituminous shale.....	0 ft. 8 in.
Coal K.....	4 to 3 ft. 1 in.
Fire clay.....	3 ft. 6 in.
	<hr/>
	90 ft. 3 in.

Coal A is seen in the bed of White river, on section twenty-four, here brought up by a ridge or hill of the olden time. Across the river in Daviess county, one hundred and twenty feet above; are relics of the cherty limestone roof of K. Intermediate, a perpendicular or projecting wall of conglomerate overlooks the valley. Riven by a crevice from top to bottom, and bruised by storm and flood, it bears strong testimony to the good quality of the rock, and furnishes a section of great interest to the geologist. (See general section numbers 14 to 24, inclusive.) The fine sands within the heavy roofed "rock houses" were filled with small funnel shaped depressions. They were the trap like homes of the ant lion.

In the neighborhood of Portersville, coal K crops out on almost every hillside, and where not visible, its position is at once indicated by the cherty limestone, which so constantly accompanies it. It has been worked for years to supply the village mill, as well as for smiths' use throughout all the neighboring region. A portion of the seam is especially sought after for the latter purpose.

Outcrops or openings were visited on the lands of Snare, Osborn, Graham and the Steam Mill Company, on sections 19, 20 and 21, township 1 north, range 5, where the average thickness was about three feet. The quality was found satisfactory for steam and smiths' use.

The following measurements on John Harris' farm, east of Portersville, gives a fair exhibit of the rocks in this vicinity :

## SECTION EAST OF PORTERSVILLE.

Silicious shales and covered.....	.....
Silicious lime rock with chunks and layers of chert and "tripoli".....	5 to 10 ft. 0 in.
Calcareo-magnesian shale, ferrugin- ous.....	3 to 2 ft. 0 in.
Flinty limestone.....	4 ft. 0 in.
Silicious shales.....	12 ft. 0 in.
Bituminous slate.....	3 ft. 0 in.
Coal K :	
Rich gas coal.....	1 ft. 2 in.
Parting .....	0 to 4 in.
Semi-block.....	1 ft. 10 in.
	3 ft. 4 in.
Fire clay.....	2 ft. 0 in.
Sandstone and conglomerate.....	35 ft. 0 in.
Water level.....	.....
	71 ft. 4 in.

For analysis of different parts of this seam I refer to the Chemist's report.

The limestone of the general section is here greatly thickened up, and becomes highly silicified, or changes more or less into chert, with cavities filled with silicious material, which has been used for the manufacture of an excellent polishing powder substituted for tripoli.

Bridenbaugh's coal, section twenty-seven, is also highly esteemed; it is overlaid with beds of black bituminous shale from three to eight feet thick. The adjoining stream, Mill creek, has cut a valley through the coal and these shales; hence a large admixture of bituminous matter in its alluvial bottoms. Decomposition sets free inflammable gases; combustion is produced on contact with the air and, according to the mode of escape, forms jets or balls of fire. Often two or more of the latter have been seen at one time traversing the valley with the uncertain motion of the wind, and with

a brilliancy reported as equaling the head-light of a locomotive. The superstitious believe them to be the wandering ghosts of persons who have been drowned in the stream.

The following measurements, taken on James Harbison's land, northwest section 26, township 1 north, of range 5, give another view of the space from K down to coal A :

## SECTION AT HARBISON FARM.

Ancient alluvium .....	20 ft. 0 in.
Ancient riffle-flints and geodes.....	30 ft. 0 in.
Coal K, block (reported).....	2 ft. 2 in.
Thin bedded sandstone.....	5 ft. 0 in.
Massive conglomerate.....	50 ft. 0 in.
Silicious and pyritous shale.....	2 ft. 1 in.
Black bituminous shale with carbonaceous partings.....	1 ft. 2 in.
Coal A :	
Choice cannel.....	0 ft. 3 in.
Choice bright coal.....	1 ft. 4 in.
	1 ft. 7 in.
Stigmarial fire clay.....	4 ft. 8 in.
Silicious shale, bituminous partings.....	15 ft. 6 in.
Silicious iron ore.....	2 in. to 8 in.
Silicious shale and flaggy sandstone.....	5 ft. 6 in.
Low water of White river.....	
	128 ft. 3 in.

In this section, the alluvial sands one hundred and twenty-eight feet above White river are too coarse and pebbly for loess. We can only refer their origin to the high water line of the adjoining stream then flowing at a level nearly one hundred and ten feet above its present channel. As before mentioned, a bed of flints, pebbles and geodes, mostly derived from the mountain limestone of Orange and Lawrence counties, is found in this deposit immediately below the sand ; other riffles containing like materials are seen south of Portersville, and on the hill in the western part of

the village of Haysville, at an average elevation of about one hundred and ten feet above the present level of White river. The sand bars are more continuous, following the river bluffs for miles, where not eroded by creeks cutting through to the river, at an elevation of one hundred and thirty feet above low water in the northeast part of the county, but, in traversing the county from east to west, approaching to within one hundred and eighteen feet of the river, and showing that the ancient stream had more fall than the present river, unless the channel was more tortuous.

The region about Haysville has been subject to severe denuding forces. Coal K has been principally removed. A is seen at the foot of all the hills beneath the massive sandstone. For local purposes, coal has been mined by Potts, near Wolf creek, reported to be of good thickness. Near the mouth of this creek, at "Rock House" Ford of White river, Col. Edmonston, found part of a *Mastodon* skeleton. One of the teeth was presented to Dr. Owen when State Geologist, and is probably in the University cabinet.

Near Kellersville, coal K, near its eastern bounds, is thin or not present. The flinty limestone, with *Spirifer camera-tus*, *Productus semireticulatus*, etc., etc., is met on the hill-tops, indicating the place of the coal, at an elevation of two hundred and fifty-five feet above White river. At Portersville, it is forty feet above the river. By subtraction, we find that K dips two hundred and fifteen feet or twenty-seven feet to the mile going west. Banks were formerly worked in sections 20, 22, 23 and 27, township 1 north, range 4, west, on the lands of Frederic Theruff, John Light and Washington Noble. The thickness was reported at from two to three feet, and the quality fair to choice for smiths' use.

At localities heretofore mentioned, the "conglomerate" is a massive, coarse, ferruginous sand rock. Here, for the first time, we find small pebbles, which become more numerous and of larger size to the east and north, and approach somewhat to the typical form, from which the name is derived. Iron ore was noticed on the hill-top west of Ludlow, some, although silicious, of good quality.



Davidson creek enters the northeast corner of the county, and, nearly in a straight line, flows in a southwesterly direction to a junction with Patoka river. On account of directness and easy grades, the banks of this creek have been selected as the route for the proposed "Rockport and Cincinnati Railway." The creek has cut a deep narrow valley down to the base of the conglomerate, and, near its sources, sixty feet below, into the solid limestone underlying.

Coal A has been formerly worked at the following localities, producing samples of compact heavy coal, with bright resinous lustre, and splinty fracture, and very rich in carbon:

Elkin's bank, southeast quarter, Sec. 29, T. 1 N., R. 3 W.

Burnham's bank, northeast quarter Sec. 28, T. 1 N., R. 3 W.

Burnham's bank, southwest quarter Sec. 21, T. 1 N., R. 3 W.

———— bank, north half Sec. 21, T. 1 N., R. 3 W.

Nicholson's bank, northwest quarter Sec. 23, T. 1 N., R. 3 W.

Harrison's bank, at southeast corner Sec. 14, T. 1 N., R. 3 W.

The openings were for local blacksmiths' use only, and were made by stripping. The coal where seen was from twelve to fourteen inches thick. Dr. E. H. Sabin who is one of the directors of the Rockport and Cincinnati Railroad, has been making explorations since my visit, and informs me that he has found at several points, coals ranging from three to four feet in thickness.

Iron ores were met at several localities marked on the map. The "pot" or "pipe ores" are very pure, and where found in sufficient quantity the quality will prove satisfactory. Ochreous and silicious ores are more plentiful, but leaner. The latter will only be useful to mix with the richer ores of Michigan and Missouri.

In this valley, silicious shales generally fill the space between coal A and the limestone. At some stations they are replaced by solid massive sandstone, resting unconformably upon the latter, and containing many stems and trunks of coal plants, nearly all worn beyond recognition by the friction of coarse material, excepting only *Stigmaria*, *Calamites* and a very few specimens of *Lepidodendron*.

The lime rock hollowed out by the creek is the upper member of the mountain limestone, but was so covered by the talus from the superimposed sandstone as to afford meager opportunity for study. The fossils were worn and broken. No good specimens were obtainable. The following were noticed: *Pentremites* (2 sp.,) Crinoid stems, plates and arms, *Terebratula*, Bryozoans (3 sp.,) and *Archimedes*. The lower oolitic member, fifty feet in thickness, is the lowest and oldest exposed formation in the county, and consists almost entirely of wave worn, crushed remains of shells, corals, crinoid stems, etc., pure and of a white "stone color;" this will prove desirable for quarry purposes as well as for burning into lime, when the projected railroads furnish transportation. In fact this valley abounds with choice building material which are especially wanted in the counties to the west and southwest. To the agriculturist, the ample and cheap supply of lime which may here be obtained will be a blessing.

A bed of choice glass sandstone was noticed on the land of Wm. Hoggett, northeast quarter northwest quarter, section 17, township 1 north, range 2 west, near the county line in Orange county. On exposure to the air, it disintegrates and becomes white and will prove an important article of trade.

During my stay in this part of the county I was indebted for hospitality, information and guidance to the Hon. Leroy Cave. His intimate acquaintance with localities made his assistance especially valuable.

Other exposures by denudation of the mountain limestone are reported on the head waters of Patoka and its affluents, commencing near the east side of section 4, township 1 south, range 3 west, and extending thence easterly to the county line. Time did not admit of an examination of this locality, but undoubtedly the exposures seen in the Davidson creek valley are here repeated.

Township number one south, range three west, is underlaid by the massive conglomerate, the thickness here ranging from fifty to ninety feet. The surface is moulded

into mighty hills by erosion of branch and creek valleys. These ravines occasionally cut down to coal A, which has been worked to a small extent at Elm Lick Bank, on the land of E. McMillan, northwest quarter section 8, township 1 south, range 3 west, with a reported thickness of two and a half feet, and at Coal Lick Bank, on W. Williamson's land, west half northeast quarter section 6, township 1 south, range 3 west, where it is twelve to fifteen inches thick. Fair specimens of silicious and ochreous ore of iron was found on sections five, six, eight, nine and seventeen, same town and range.

At the east end of the mill-dam at Knoxville were noticed the following fossils, *Lepidodendron* (3 Sp.), *Sigillaria* (2 Sp.), *Alethopteris Serlii*, *Cordaites borassifolia*, and *Calamites*; in the bituminous lime rock, *Spirifer cameratus*, *Athyris subtilita*, *Productus costatus*, a *Rhynchonella*, and a *Phillipsia*.

In that part of township number one south, range number four, on the south and east side of Patoka, the conglomerate ores of iron are more abundant. Good to fair surface exposures were noticed on the following farms, viz.:

Stevenson, north half section number 16.

Dudine, southwest quarter section number 15.

Brochman, northwest quarter section number 22.

Brocemar, northwest quarter section number 22.

Breitweiser, northeast quarter section number 29.

Unaway, northwest quarter section number 28.

At many of these localities "pipe" or "pot" and ochreous ores were of rather superior quality, especially at the hill southeast of Riley's mill, locally known as the "Iron Mountain." At all these points the quantity of ore I fear is limited. This fact can be settled by excavation only.

Coal K has formerly been worked to a small extent at Fecher's, section 20, Herbig's and Krass', section 29, and at Snyder and Friedland's, section 31, all township 1 south, range 4. The banks had fallen in, and no opportunity of measurement was afforded. The thickness was

reported at two to two and a half feet. Powel and Stein's bank, section 23, same township and range, was visited under the guidance of Dr. Stevenson. The roof had fallen in; a few fragments found indicated a good smithing coal. In the compact under-clay, we saw casts of *Stigmaria*, *Fucoides*, showing the bark between the bud pits beautifully ornamented with lines arranged in concentric rings around the pits. The spirally twisted spines or rootlets were in good preservation.

At Jasper, coal K is seen at low water. Going east, the surface presents a succession of valleys and hills gradually increasing in height until at the east line of the county it attains an elevation of four hundred feet above Patoka river. The coal rising at the rate of fifty to seventy feet per mile soon mounts to the surface, and thence to the east the more persistent limestone roof can still be seen, indicating the place of the seam; the coal itself being no longer present.

These flints were common near V. Beitz's, sections 35 and 36, township 1 south, range 4 west, accompanied by a considerable quantity of ochres of many colors. Immediately below was seen the red sandstone, the level at which the silicious iron stones are found, supported by the massive conglomerate sixty to one hundred feet thick.

Near Celestine, coal A has been worked on the following lands, affording a fair article of steam coal, but generally with some sulphur present:

Schneider's, northeast quarter Sec. 35, T. 1 S., R. 4.

Kish's, northeast quarter Sec. 4, T. 2 S., R. 3.

A. Kish's, northwest quarter Sec. 4, T. 2 S., R. 3.

Hawhee's, northwest quarter Sec. 3, T. 2 S., R. 3.

These banks were not in work, and were reported to range from two to three feet in thickness.

Near the last mentioned banks a coarse, disintegrating white sand rock was noticed, which would furnish a fair article of glass stone. Going southward along Prechtel branch this stratum was seen at intervals, but frequently

the material was fine and well compacted, as on sections 15, 16, and 22, where the glass-rock and grits suitable for grindstones often change into a heavy bedded deposit of beautiful snow-white sand rock. This is valuable, and will be sought after for door and window caps, and ornamental coping and cornice work of first class city buildings. Having a capacity to withstand great heat, this stone will be found especially desirable in buildings sought to be made fire-proof.

The following section was taken on Mrs. Conly's land, east half southeast quarter section 16, township 2 south, range 3, near the foot of the hill:

## SECTION AT CONLY'S.

Slope .....	.....
Massive red conglomerate .....	47 ft. 0 in.
Coarse red sand rock, with many <i>Sig-</i> <i>illariæ</i> and <i>Lepidodendra</i> .....	8 ft. 0 in.
White sandstone.....	10 ft. 9 in.
Hard, fine snow-white grit and orna- mental rock.....	7 ft. 0 in.
Limestone, coarse, silicious, with <i>Dis-</i> <i>cina</i> , <i>Spirifer cameratus</i> , <i>Productus</i> <i>costatus</i> , etc., etc.....	10 to 4 ft. 0 in.
Covered.....	12 ft. 0 in.
Coal A.....	1 to 2 ft. 0 in.
Fire clay.....	2 to 4 ft. 0 in.
<hr/>	
94 ft. 0 in.	

On Hall and Prechtel creeks strong springs (brackish) often break out at the foot of the hills. Almost invariably they may be taken as an indication of coal, as they flow out above or below impervious strata connected with seam A.

In the vicinity of Schnellville no mines were being worked. Outcrops were observed, or openings had been made, at the following localities, viz:

McIntyre, north half Sec. 18, T. 2 S., R. 3 W.  
 Burnham, southwest quarter Sec. 14, T. 2 S., R. 3 W.  
 Cooke, northeast quarter Sec. 14, T. 2 S., R. 3 W.  
 Hanger, northeast quarter Sec. 15, T. 2 S., R. 3 W.  
 McCarthy, east half Sec. 16, T. 2 S., R. 3 W.  
 Conly, S. E. quarter S. E. quarter Sec. 16, T. 2 S., R. 3 W.  
 Conly, south half Sec. 20, T. 2 S., R. 3 W.  
 Main's, southeast quarter Sec. 21, T. 2 S., R. 3 W.  
 Shoulder, north half Sec. 21, T. 2 S., R. 3 W.  
 Atkins, north half Sec. 21, T. 2 S., R. 3 W.  
 Grant, west half Sec. 22, T. 2 S., R. 3 W.

The above coals are from one to two feet, rarely exceeding eighteen inches in thickness, and of fair quality. Kidney and ochreous iron stones occur on sections nine, fourteen, twenty and twenty-two; the ochres have been used for painting houses and barns, the colors prove brilliant and durable.

Two miles and a half south of Schnellville, and on the line of the proposed Louisville and St. Louis Railroad, coal A becomes of good thickness. J. D. Hays' bank was being worked, affording a compact, splinty-cannel coal free from sulphur, of a bright vitreous lustre almost as clear as anthracite, and equal if not superior to any other western coal. For analysis I refer to the Chemist's report:

**SECTION AT J. D. HAYS' BANK. (WEST HALF NORTHWEST QUARTER SECTION 33, TOWNSHIP 2 SOUTH, RANGE 3 WEST.)**

Slope .....	15 ft. 0 in.
Massive sand rock.....	20 to 40 ft. 0 in.
Yellow ferruginous sand rock.....	15 ft. 0 in.
White sand rock.....	12 ft. 0 in.
Soapstone.....	2 to 15 ft. 0 in.
Argillaceous and Calcareous iron stones.	1 ft. 6 in.
Blue shale, pyritous.....	3 ft. 0 in.
Black shale.....	2 ft. 6 in.

**Coal A :**

Slaty cannel.....0 ft. 3 in.

Bright splinty cannel.....2 ft. 4 in.

Coarse block.....0 ft. 8 in.

————— 3 ft. 3 in.

Fire clay..... 3 ft. 0 in.

Shaly sandstone.....10 to 15 ft. 0 in.

(Continued from a neighboring point :)

Black and blue bituminous shales.....12 ft. 0 in.

Rash coal..... 0 ft. 2 in.

Fire clay..... 2 ft. 0 in.

—————  
139 ft. 5 in.

This seam is not thick, compared with those of other regions ; yet, when the large proportion of carbon in a condensed form, the freedom from dust and other offensive admixtures, and the handsome appearance is taken into consideration, its value and importance becomes at once apparent. Desirable for parlor use, it will work not less satisfactorily in the blast furnace. An opening of the same seam on the Weidenboner farm, northeast quarter section 33, made by George Laughbemies, showed thirty-two inches of coal nearly equal to that of the Hays' bank.

**LIST OF OPENINGS NEAR HAYS'.**

J. D Hays, northwest quarter Sec. 33, T. 2 S., R. 3 W.

Wash. Chandy, southwest quarter Sec. 33, T. 2 S., R. 3 W.

Dr. Railing, N.E. quar. N.W. quar. Sec. 33, T. 2 S., R. 3 W.

Joe. Weidenboner, N. E. quarter Sec. 33, T. 2 S., R. 3 W.

E. Able, jr., southwest quarter Sec. 28, T. 2 S., R. 3 W.

E. Able, sr., northwest quarter Sec. 34, T. 2 S., R. 3 W.

These mines will average about three feet of good coal.

Going east from the Hays bank, the highway passes over a succession of ridges from two hundred and fifty to three hundred feet above the Patoka at Jasper, and ascends at Birdseye to the most elevated point visited in the county,

four hundred feet above the Patoka and eight hundred and seventy-five feet above the ocean.

The "massive" band of sandstone is here very compact and widens to a thickness of from fifty to one hundred feet. In it are seen rolls and sporadic sheets of coal of small extent, while more regular seams, subject to currents strong enough to transport the coarse material of which the sandstone is composed, are frequently interrupted by erosion or paucity of material. Beneath the massive sand rock are well developed beds of prytous shales, which, on exposure to the atmosphere, decompose and melt away, while the mighty stratum above still remains, forming "rock houses" under which droves of animals and whole tribes of Indians have been known to take shelter from the snows and storms of winter. From the precipitous face of this roof, large blocks of stones have fallen, which no doubt served to ward off winds and drifting snows, and at other times as seats and lounges for our barbaric predecessors. In these blocks cylindrical cavities, having a depth of from six to twenty inches and a diameter of about five inches, are found. Perfect in form and apparently showing design in their construction, they are locally known as "Indian mortars," for grinding corn and roots. They may possibly have been used for this purpose but their origin is probably due to natural causes.

Seeking shelter from a passing shower in one of these houses, I noticed a small stream of water falling upon the flat surface of the block of stone upon which I was seated. A few tiny pebbles from the conglomerate above were collected in small depressions and kept in constant motion by the dropping water. Thus drops of water and shot-like pebbles were drilling basins down into the solid rock. This experience was afterwards repeated at other localities.

Knolls of loess cap the highest hills, furnishing a rich loamy soil, which produces poplar, maple, spicewood, paw-paw, and other shrubs indicating an alluvial soil. This deposit is from twenty to forty feet thick in the north half section 25, township 2 south, range 3 west.

Near Birdseye, seam A has been opened at the following



places, furnishing a fair to good article of coal, in thickness varying from eighteen inches to three feet and averaging twenty inches, viz.:

D. Pruitt's, N. W. qr. S. W. qr. Sec. 24, T. 2 S., R. 3 W.  
T. King's, northwest quarter Sec. 25, T. 2 S., R. 3 W.  
J. King's, northeast quarter Sec. 25, T. 2 S., R. 3 W.  
Coal Spring, N. E. qr. N. W. qr. Sec. 26, T. 2 S., R. 3 W.  
Ab. Pruet's, northwest quarter Sec. 26, T. 2 S., R. 3 W.

A stratum of bituminous limestone eight to twelve feet thick was visited on southwest quarter of southwest quarter of section 24, and northeast quarter of section 21, township 2 south, range 3 west. It was about the level of coal A, but connection could not be seen. It contained *Productus costatus*, *Spirifer cameratus*, *Athyris subtilita*, and plant remains.

Good ores of iron were noticed on the farm of S. Pruet, southwest quarter section 23, township 2 south, range 3 west. Upon completion of the railroad near, this deposit will merit exploration.

In Crawford county, three to four miles northeast from Birdseye, coal A. is found on the farms of P. Newton, Mr. Dewitt J. B. King and Lewis Morgan, reported to have an average thickness of two feet.

The north half of township 3 south, range 3, presents a succession of hills, sometimes rounded by circular ravines into the form of pretty regular cones. One of these was found on measurement to be two hundred and fifty feet high, and capped with loess loam. Half way down the side flinty limestones and ochreous and kidney iron ores indicate the place of seam K, here at its easterly margin not endowed with coal. Below are the different members of the conglomerate sandstone, with the massive division, at places widened up to a thickness of over one hundred feet. At the foot of the hills, many strong springs burst out, with waters impregnated with salt, sulphur and iron. They are regarded as a pretty sure indication of coal or of the imper-

vious strata accompanying seam A. Wood is abundant. There is no demand for coal, and none dug or looked for.

Out-crops occur on sections number 2, 3, 6, 7, 16, 17 and 18. No work was being done. No measurements could be secured. The reported thickness ranged from two to four feet with an average over three feet.

Going westward from Schnellville, we find a heavy ridge of massive sand rock projected into the coal basin. It is cut across by Hall's creek, Strait creek and their branches, and divided into a succession of hills or peaks from two to three hundred feet high. The upper portion of these is often covered with loess, or under clays and remnants of the flinty limestone roof of coal K. The soil of the lower knolls and valleys, composed of the pulverized debris quarried from the coal measures and mountain limestones by powerful currents flowing from the east at the close of the glacial period, is a sandy loam and often of a reddish tint from the presence of ferruginous matter derived from the subcarboniferous iron ores. Pears and other tender fruits may be grown here at great advantage. A fine grove of chestnut trees is found on sections 14 and 23, township 2 south, range 4 west. Another on section 13, laps over into section 18, township 2 south, range 3 west.

At St. Anthony, seam A is worked to supply A. Kesler's steam mill. It is here well developed, ranging in thickness from three to four and a half feet, and averaging three feet seven inches. The coal is of good quality; the middle division bright, lustrous, compact, splinty cannel, rich in carbon, and will probably answer for all purposes for which block coal is needed.

#### SECTION AT KESLER'S, ST. ANTHONY.

Slope covered.....	.....
Ferruginous sandstone .....	20 ft. 0 in.
Massive conglomerate .....	20 to 40 ft. 0 in.
Sandy shale .....	8 to 10 ft. 0 in.
Black bituminous clay shale.....	3 ft. 0 in.

## Coal A:

Pyritous slaty coal.....	0 ft. 3 in.	
Cubic coal.....	3 in.	
Compact splinty coal.....	1 ft. 3 in.	
Slaty cannel.....	5 in.	
Caking coal .....	1 ft. 0 in.	
Rash coal, sulph. balls.....	0 ft. 9 in.	
		4 ft. 0 in.
Fire clay .....		4 ft. 0 in.
Ferruginous sandstone .....		5 ft. 0 in.
Total.....		86 ft. 0 in.

Out-crops and old openings are seen at the following points, viz.:

Reed's, northwest quarter Sec. 13, T. 2 S., R. 4 W.  
 Klein, northwest quarter Sec. 24, T. 2 S., R. 4 W.  
 Miller, northeast quarter Sec. 23, T. 2 S., R. 4 W.  
 Kunkle, northwest quarter Sec. 25, T. 2 S., R. 4 W.  
 Cox, northwest quarter Sec. 21, T. 2 S., R. 4 W.  
 Cox, northeast quarter Sec. 21, T. 2 S., R. 4 W.  
 Fleck, northwest quarter Sec. 16, T. 2 S., R. 4 W.  
 Able, northwest quarter Sec. 20, T. 2 S., R. 4 W.

At Bretzville, Mr. W. Bretz finds coal in the bottom of a branch on the northwest quarter of section 32, one foot thick, having been thinned by erosion at this place. He has also mined coal for shop use on southeast quarter section 30, township 2 south, range 4 west, and has seen out-crops on that quarter section from three to four feet thick. After long trial he reports this as choice blacksmith's fuel. Coal has also been dug to in the well of David Abel, in the northeast quarter of same section.

A ready-made pass-way for the different railroads seeking a northern outlet is furnished by the valley of Hunley's Creek, which traverses the high ridge dividing the waters of the Patoka from those of the Ohio river, and thus offers a level gateway to the engineer through the massive sand

rock. The upper division of the conglomerate here is but slightly compacted and easily disintegrates. The debris from this washed by the flood waters of the creeks yields a choice article of plasterers' sand. Good beds, which supply the home market, are seen on the Lukens' farm, southwest quarter section 16, township 3 south, range 4. In the same neighborhood is a stratum of clay filled with fragments of quartz and flint, unconformably deposited and probably of glacial or subsequent age.

Ferdinand is a thrifty village, surrounded by a fruitful soil and happy prosperous people. For the latter it is greatly indebted to their Catholic priest, who prudently and kindly cares for the temporal as well as for the spiritual interests of his charge.

Seam K is seen at the top of the hills and knobs, here represented only by a thin stratum of bituminous shale, but with the flinty limestone roof and under-clay well developed. A is found near the water level, under the massive sand rock. The barren seam K is accompanied by other minerals which more than compensate for the absence of the usual carbonaceous deposit.

The "Anderson Valley Mining Company"—J. B. Gohman, Dr. Kempf, Dr. Bindwald, and John Baunline, proprietors—after a thorough examination, opened their mines in the south half section 34, township 3 south, range 4. Here all the different minerals accompanying the place of seam K were found abundant, and are all utilized. Lime is burned from the roof rock; from cavities in the more flinty portions a soft silicious stone is obtained and used for the manufacture of a polishing powder, or "tripoli," of superior quality. The clay, iron stones, and decomposed nodules furnish ochreous paints of seven distinct natural shades. These ochres are free from silex, and after a test of three years by the Louisville and Nashville, the Louisville, Cincinnati and Lexington, the Evansville and Crawfordsville, and the Louisville, New Albany and Chicago railroad companies, and by other large manufacturing establishments, have been found in use profitable, durable, and

satisfactory. By combination of the seven distinct natural colors with white lead, almost any shade may be produced, as may be seen by the fourteen specimen colors deposited in sample jars at the cabinet in the rooms of the State Board of Agriculture.

SECTION AT THE MINES OF THE ANDERSON VALLEY MINING  
COMPANY.

Slope .....	10 ft. 0 in.
Shaly soapstone " <i>steatite</i> " paint.....	3 ft. 0 in.
Dark and light "butternut" paint	1 ft. 4 in.
Dark and light "Bismark brown" paint.	
Bituminous limestone, with <i>Productus punctatus</i> , <i>P. longispinus</i> , <i>P. cora</i> , <i>Spirifer cameratus</i> , <i>S. lineatus</i> , <i>S. Kentuckensis</i> , <i>Nautilus decoratus</i> , <i>Cyrtoceras</i> ———, <i>Terebratulula brvidens</i> , <i>Athyris subtilita</i> , <i>Hemipronites crassa</i> , <i>Aviculo-pecten providensis</i> , <i>Fusulina cylindrica</i> .....	3 ft. 0 in.
Limestone, changing into "coral earth," with beautiful plates and spines of <i>Archeocidaris mucronatus</i> , <i>A. Wortheni</i> , Crinoid stems, plates, and arms, stems and crushed plates of <i>Pentremites</i> and other mountain limestone animals.....	0 ft. 8 in.
"Terra de Sienna" and yellow ochre..	1 ft. 1 in.
Coal K.....	.....
Bituminous shale—"dark umber".....	0 ft. 8 in.
"Yellow ochre".....	1 ft. 3 in.
Fire clay with stigmarial rootlets.....	3 ft. 0 in.
Potters' clay—"Dubois cream," or "stone color".....	4 ft. 0 in.
Bedded sandstone and covered to branch.....	75 ft. 0 in.
	<hr/> 103 ft. 0 in.

This locality was selected on account of yielding nearly every kind of mineral needed for the manufacture of these paints, and on account of the remarkable freedom from silica which makes washing unnecessary. The ores are roasted, ground, then graded by screens of different degrees of fineness and the product is ready for market.

Paint stones and ochres are found on almost every hill-top around Ferdinand. The supply is ample to employ an extensive factory continuously, and, to meet the wants of a continent. "Tripoli" found on the farm of Herbert Beike, northeast quarter northwest quarter section 26, township 3 south, range 4 west, is used for making polishing powder. It is a porous mass of silicious material, having the same specific gravity as European tripoli, and is derived from the flinty limestone roof of coal K. This stone was noticed at other points and may be obtained in considerable quantities. Two grades are prepared by the "Anderson Valley Mining Company," one an impalpable powder for polishing gold, silver, and metallic mirrors, another coarser for household and kitchen use. Specimens of the manufactured product were submitted to competent authority for determination. Dr. R. H. Ward, Microscopic editor of the *American Naturalist*, and S. A. Briggs editor of the "*Lens*," the *Chicago Journal of Microscopy*, after careful examination, report that the earth is not infusorial, and that its actual composition requires further examination.

Good quarry rock is found in the "massive beds," of the conglomerate, specimens of which, long in use, may be seen in the facings and copings of the Catholic church.

A few of the creeks have cut their valleys down to the level of coal A, ninety to one hundred and ten feet below the place of K.

Openings have been made at the following points, with coal from one and a half to two feet thick:

Leuken's, southwest quarter Sec. 13, T. 3 S., R. 4 W.

Ebert, southwest quarter Sec. 11, T. 3 S., R. 4 W.

Hardwick, northwest quarter Sec. 9, T. 3 S., R. 4 W.

Hoffman, southeast quarter Sec. 19, T. 3 S., R. 4 W.

Mehling, southeast quarter Sec. 35, T. 3 S, R. 4 W.

H. B. Kathman's bank has been considerably worked just over the line in Spencer county, northwest quarter northeast quarter section 3, township 4 south, range 4 west. The exposures give the following exhibit:

#### SECTION AT KATHMAN'S.

Slope .....	.....
Silicious soapstone with plants.....	2 ft. 0 in.
Coal A :	
Inferior coal.....	0 ft. 8 in.
Good bituminous coal.....	1 ft. 2 in.
	————— 1 ft. 10 in.
Fire clay, with <i>stigmara</i> twisted and strangulated into different shapes with balls and tubers separate or connected .....	4 ft. 0 in.
Bed of creek.....	.....
	————— 7 ft. 10 in.

North of Henrysville, John Fest has opened seam A at several places on northeast quarter section 25, township 3 south, range 5 west, specimens were obtained for analysis. Mr. Fest reports that jack-o'-lantern is often seen of dark nights in the ravine near his coal bank, and would gladly connect the phenomena with hopes of silver ore instead of the true cause—carburetted gases.

The same seam outcrops on the line dividing sections 24 and 25, at the quarter section post, and gives this exposure:

#### J. FEST AND J. LINGER SECTION.

Slope with flints from roof of K.....	12 ft. 0 in.
Laminated and massive sandstone.....	30 ft. 0 in.
Thin bedded sandstone.....	5 ft. 0 in.

Compact sandstone.....	2 ft. 0 in.
Coal A.....	3 ft. 0 in.
Fire clay, dark.....	4 ft. 0 in.
Branch.....	.....
	<hr/> 64 ft. 0 in.

Going west from this point, flints from the limestone roof of K were seen on sections 23 and 22, and a pretty thick bed of clay ironstones ("paintstone") on the Noemiller farm, section 21, all indicating the place of that seam, and forming a good horizon from which to measure down to coal A, which lies about ninety-three feet below.

Sandusky Williams, Esq., reports finding in a well near his residence, section 28, at a depth of seventeen feet, a bed of yellow ochre, three feet nine inches thick, underlaid by a four feet stratum, of ochreous soapstone. Specimens from this fine bed of natural paint were secured for the State Cabinet.

Continuing west, coal K becomes normal. No longer barren, it affords from two to three feet of tolerable coal, and was worked several years since on the Kemp farms, sections 31 and 32, township 3 south, range 5 west.

The limestone roof here loses in a great measure its flinty character, and is often seen in place or in detached blocks from one to three feet thick. At places it is profusely filled with fossils, viz.: *Spirifer cameratus*, *Productus punctatus*, *P. semireticulatus*, *Bryozoans* (3 Sp.), Coral pipes and Crinoid stems.

At Holland, seam K becomes still more persistent, and the accompanying ores of iron are abundant. Good beds of the latter were seen, apparently one and a half to two feet thick, on sections 22 and 23, township 3 south, range 6 west; also on Greenway's farm, northwest quarter section 27, township 3 south, range 6 west, a stratum eighteen inches thick was passed in digging a well, and reported to be of fine quality.

Openings have been made near Holland for local use, viz :



Rosamyer, S. E. qr. S. W. qr. Sec. 14, T. 3 S., R. 6 W.  
 Seaba, N. E. qr. N. E. qr. Sec. 15, T. 3 S., R. 6 W.  
 Otto, S. E. qr. S. E. qr. Sec. 15, T. 3 S., R. 6 W.  
 Schepman, N. W. qr. S. E. qr. Sec. 23, T. 3 S., R. 6 W.  
 Feldwich, N. E. qr. S. W. qr. Sec. 23, T. 3 S., R. 6 W.  
 Greenway, N. W. quarter Sec. 27, T. 3 S., R. 6 W.  
 Licbert, section 24, township 3 south, range 6 west.

At these places the coal was found to range from one to two and a half feet in thickness.

The section taken on the southeast quarter section 29, township 3 south, range 6 west, in Warrick, near southwest corner of Dubois County, shows an additional seam, and the stigmarial under-clay proves conclusively that it is independent.

SECTION AT INGHAM'S BANK, WARRICK COUNTY.

Slope or covered sandstone.....	50 ft. 0 in.
Thin bedded sandstone.....	10 ft. 0 in.
Silicious shale.....	4 ft. 6 in.
Black sheety slate.....	2 ft. 0 in.
Black sheety slate with pyritous bowlders containing twenty species of fossils, including the gigantic fish <i>Edestus Vora</i> .....	0 ft. 8 in.
Coal:	
Pure cubic.....	0 ft. 8 in.
Hard splinty.....	0 ft. 8 in.
	1 ft. 4 in.
Stigmarial clay.....	3 ft. 1 in.
Rash coal.....	0 ft. 5 in.
Stigmarial clay.....	1 ft. 4 in.
Dark bituminous clay.....	1 ft. 3 in.
Coal, inferior.....	3 ft. to 2 ft. 0 in.
Fire clay.....	3 ft. 0 in.
	79 ft. 7 in.

North from Holland the ridge of sandstone soon becomes well developed. Rock houses are found under the "Massive" member of the conglomerate on section 34, township 2 south, range 6 west. They have been used as habitations by the Indians, and human bones have been found mixed with alkaline tufa upon the ancient hearthstones, by Dr. Rust, of Holland.

Coal has been worked on the Todrank farm, and from Rothert's bank, section 27, township 3 south, range 6 west, large quantities have been hauled to Huntingburg for blacksmiths' use, and found to be of superior quality. Beds of sand similar to those mentioned near Ferdinand, are found on sections 5 and 8, and at Rousher's west half section 4, township 3 south, range 5 west, considerable amounts are gathered and sold for plasterers' use. On the Miessner farm, east half of same section, a deposit of kidney and clay iron stones was noticed, apparently of considerable extent and of excellent quality.

Huntingburg is a thrifty village containing several steam mills, mechanical establishments, and extensive warehouses. Large amounts of tobacco are exported. The soil of the south part of Dubois is composed principally of the reddish brown loam famous for excellent "cigar leaf." The strata accompanying K, here barren, are found at the top of the hill north of the village. The calcareo-magnesian roof, somewhat flinty, is quarried for pavements and foundations. The under-clay develops a thickness of from four to seven feet and is a superior potters' clay. Tested in a smith's forge it burns snowy white without change of form, and invites the attention of manufacturers of queensware and stoneware. Dr. Beeler informs me that it has been examined by experts, who pronounce it superior to any clay in this country, and fully equal to Scottish clay for the manufacture of white crockery. A practical test is needed.

SECTION AT BEELER'S HILL, HUNTINGBURG, (NORTHWEST  
QUARTER SECTION 34, TOWNSHIP 2 SOUTH, RANGE 5  
WEST.

Soil.....	10 ft. 0 in.
Cherty limestone (magnesian) with sil- icious earths and <i>Productus</i> , <i>Hemi-</i> <i>pronites</i> , <i>Bryozoa</i> , <i>Spirifera</i> , etc.....	8 ft. 0 in.
Soft silicious shales.....4 to	10 ft. 0 in.
Coal K.....2 in. to	0 ft. 6 in.
Potters clay, choice.....5 to	7 ft. 0 in.
Bituminous streak.....	0 ft. 4 in.
Ochre "sienna" color.....4 in to	0 ft. 6 in.
Dark shale.....	7 ft. 3 in.
Ochreous concretions and iron nodules in soapstone.....	12 ft. 0 in.
Light colored soapstone.....	3 ft. 0 in.
Silicious and aluminous shale contain- ing plant remains and silicified trunks of coal plants two and a half to three feet in diameter.....	20 ft. 0 in.
Shaly and compact sandstones covered.	58 ft. 6 in.
Massive quarry sandstone.....	10 ft. 0 in.
Argillaceous shale.....	4 ft. 0 in.
Coal A :	
Compact lustrous coal.....1 ft. 6 in.	
Block.....0 ft. 4 in.	
	1 ft. 10 in.
Fire clay.....	3 ft. 4 in.
	136 ft. 3 in.

At John DeBeer's shaft in the eastern part of the village, and at several wells, coal A was found about eighteen feet below the surface, and under strata similar to those given in above section.

About twenty-five years ago, Mr. Geiger bored for water to supply a mill. Tradition of "old settlers" says that at a depth of seventy-five feet he passed through a seam of

coal five feet thick. No out crop of such a seam is visible at other points, hence their report is probably unfounded.

The quarry sandstone at Huntingburg is heavy bedded, with bands one to two feet thick. To the northeast it soon becomes coarse and massive, and half way between this town and Jasper, attains a thickness of seventy feet, and forms a high ridge which is traversed by several creeks following north to the Patoka.

In concluding this report of details, it is proper to remark that the determination of the coal seams, seen at isolated stations and often with but slight exposures of accompanying strata, is given as the best that could be made with the time and opportunities then available. It is believed that they are generally correct, and I find nearly the same determinations adopted by Col. J. W. Foster and other geologists in employ of the different railway companies. With better exposures afforded by the large development hoped for hereafter, the future geologist may correct errors caused by meager material.

### ECONOMICAL GEOLOGY.

Dubois county was organized A. D. 1817. The population in the middle and eastern parts is mostly of German descent. The Catholic religion prevails; large churches have been erected by this sect at Jasper, Celestine, St. Anthony, Henrysville and Ferdinand. Moravian Hollanders occupy the neighborhood of Portersville, Huntingburg and Holland. These branches of the German race form communities to some extent isolated from the balance of the State. The German and Dutch languages are generally spoken. Many of the old fashioned customs and habits of the "fatherland" are common. Fete days take the place of ordinary new world festivals. The men are noted for the frugal thrift characteristic of their race, while the women and girls often share the toil of the shop and the field.

The mining development of this county belongs to the future. With plenty of timber for fuel there has been no

demand for coal, except the small amount needed for smith's use. When part or all of the different railways now projected shall have been finished, means of outlet for the product will cause new mines to be opened; mechanical and manufacturing establishments and the spirit of progress will infuse new vigor into every artery of life.

The coal deposits of Dubois county, although thinner than those of more favored districts, will be found ample to supply all home demand for mills, glass works, potteries, etc., etc., and at the same time afford a generous allowance for export.

Extensive beds of iron ore occur in connection with the subcarboniferous sandstone. Highly silicious, they will be found most valuable to mix with the purer ores of Missouri and Michigan. Very considerable deposits of kidney ore as seen in the western and southern parts of the county, some of which will justify exploration. It is not probable, hardly possible, that the ores of any of the other useful metals will ever be found in quantities.

#### CLAY.

Material for the manufacture of bricks is abundant in all parts of the county. The under-clays accompanying seam A are generally silicious, and will prove suitable for the manufacture of fire brick. The under clay of seam K is usually plastic, and at some points in the southern part of the county seems to afford choice material for potters' use. A practical test, will, it is believd, develop qualities in the Huntingburg clay which will command the attention of manufacturers.

#### PAINTS.

The paint mill of the "Anderson Valley Mining Company" is located at the town of Ferdinand. The roasting furnaces, mill and stamps have a capacity for grinding and preparing 2,500 pounds a day. The supply of mineral at their mine and surrounding openings is unlimited. The quality of their paints is eminently satisfactory and chal-

lenges comparison with the best foreign competitor. The only want is cheap transportation which will soon be supplied by railroads now in process of construction.

#### STONE.

The "subcarboniferous" or "conglomerate" sand rock of this county is well developed, and will yield an unlimited amount of stone suitable for superstructures as well as foundations. Fresh from the quarry it is soft enough to work readily, but hardens on exposure. Noted for a capacity to resist the action of fire, it merits and will command the attention of city architects and the erectors of furnaces and forges.

#### TIMBER.

The forests are filled with the following varieties, viz.: White, black, chestnut and over-cup oak, yellow and white poplar, walnut, beech, sugar, elm, gum, and a large number of small trees. Mistletoe is found growing on elms and the black gum. Large rafts of poplar logs are floated down Patoka river.

#### SOIL.

The soil of the county is not of the best. Fair crops of corn, wheat, oats, and grass are produced. Underdraining, with a modern system of culture, will develop a high value for the flat bottoms near and along the Patoka. The southern part of the county is well adapted to the production of a superior quality of tobacco. Extensive warehouses for storing this product are erected at Huntingburg, Holland, and Ferdinand, and large amounts are exported.

#### FRUITS.

The climate and soil is well suited for the culture of the tender fruits. Here the pear and the peach is free from many disasters and diseases incident to a more northern situation. The quality of the fruit is excellent, and we hope that the people of this county may be induced to reap and enjoy the same luxuries and the same profits that accrue to citizens of counties east and west of them.

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Acknowledgments are due to the following gentlemen for information and assistance, viz.: Col. B. B. Edmonston, Dr. Wellman, Dr. Stevenson, C. Doane, and the county officers at Jasper; Dr. Freeland, at Portersville; Hon. Leroy Cave, at Ludlow; Wm. King, at Birdseye; Dr. Kempf, John B. Gohman, and the Abbot of St. Meinrad, near Ferdinand; Dr. Rust and S. Williams, at Holland, and Mr. Rothert and Dr. Beeler, at Huntingburg.

Thanks are returned to the President and Directors of Jeffersonville and Indianapolis, and Evansville and Crawfordsville Railroads, for favors rendered with their usual courtesy.





# GEOLOGY

OF

## PIKE COUNTY, INDIANA.

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### GENERAL FEATURES.

Pike County is bounded on the north by Knox and Daviess, east by Dubois, south by Warrick and Gibson, and west by Gibson; and contains 338 square miles. White river forms its northern limit. Patoka river crosses it centrally from east to west. The former is navigated at the spring and winter floods by steamboats and broad-horns, and the latter by rafts and flatboats. Numerous creeks and branches in all parts drain off the rain fall. The surface is level or gently undulating, except the middle portion of the eastern side, where hills and deep, stone-walled valleys are contrasted with romantic boldness. The bottoms and terraces of White river are extensive and wonderfully productive. Those of the Patoka and its affluents are of exaggerated width compared with the present sizes of these streams, and, generally formed from "modified loess," are cold, impervious to air and moisture, and not well improved. Springs of *pure* water are scarce, and owing to the constitution of the soil, many wells in the eastern part of the

county can not favorably compete with cistern water for drinking and culinary purposes.

The upland soil is a black, brown, or red loam, and was originally covered with a magnificent growth of timber. Some unrivalled groves of white oak, poplar, and hickory are still standing.

The beds of coal are numerous, of great thickness, and of good quality.

These treasures of the field, the forest, and the mine, are isolated and undeveloped. They urgently invite the construction of railways for their transportation, and promise immediate and remunerative returns.

#### SURFACE GEOLOGY.

*The Glacial Drift*, so constant a feature in the central and northern parts of the State, can hardly be recognized in this county. Beds of pipe and potters' clay, on Case's farm, near Highbanks, obscurely laminated and interchanging with layers of sand, are with doubt referred to this age. True boulders and gravel from the drift are sparingly met with, even at the southern boundary of the county; but so rare are they as to be pointed out as curiosities. Their transportation has been effected by rivers and water courses.

*The Loess Loam* is found in place on a few of the high hills northeast, south and southeast from Pikesville. Modified and washed by the rains of ages, the ash-gray impalpable sands of this deposit, cover the hill sides, and form the cold soils of the Patoka bottoms.

At the close of the loess epoch, the great currentless rivers and lakes, on whose borders this loamy soil was deposited, were, by oscillation in the earth's crust, drained away by more rapid discharge of their waters to the southwest. The change was probably gradual and was accomplished in the course of many centuries. During this time the Wabash, White and Patoka rivers, and perhaps the Ohio, traversed the western and southwestern parts of the county, and taken separately or as a whole, have left marks by which

their courses may be indistinctly traced. The valley of South Patoka, a basin nearly eight miles square, has been eroded to a depth of from 120 to 160 feet, but still retains a surrounding wall of peaks and hills. In this wall of hills the strata are in regular order. One is the counterpart of the others; showing conclusively that the basin owes its origin to erosion. From the absence of clays and gravels, this was done subsequent to the glacial period, and as I infer, by the joint action of two or more of these rivers.

The results indicated above, and other facts noticed in the detailed report, warrant the opinion that rivers have traversed the western and southwestern parts of this county in almost every direction. This view is further confirmed, by the existence of a large system of terrace deposits southwest from Winslow, locally known as the "Barrens," which is evidently an old river-bed silted up with fluvial drift, and the "mulatto loam" or "poplar divide" running parallel with and between Patoka and White rivers.

To the east of Petersburg, on the Jasper road, is spread out a large extent of country almost perfectly level, having a black rich soil, and a young growth of timber. This was evidently a prairie country at no distant period. Beneath the surface, beds of clay and sand, distinctly laminated, with fragments of trees and enormous grape vines, point out the lacustrine origin of the plain, and indicate a warm climate for the growth of the vegetation inclosed.

This plateau is bounded at the north by ancient sand bars on the bluffs of White river, one hundred to one hundred and ten feet above the present channel, which indicate the high-water level of the ancient river. These are further noticed in the Geology of Dubois county, and conspicuous examples may be seen at Sand Hill north of Petersburg, at Highbanks, and at the railroad cut in the north part of township number 1 north, range 7.

#### PALEOZOIC GEOLOGY.

The only rocks visible in this county are the massive conglomerates or subcarboniferous sandstones, and those of the

coal measures proper. The following connected section brings in one general view all the rocks and coals from the uppermost seam of the Indiana and Illinois coal fields down to the conglomerate seam A. It will be seen that the space from A to K, so richly filled with block coals in Clay county, is here almost entirely barren. A single seam in the southwest part of the county, apparently located between A and K, may, with doubt, be referred to I. The section commences near the county line, west of Centerville, and ends at the lowest visible beds east of Pikesville.

\*CONNECTED SECTION.

SPACE.		FT.	IN.	
84.		1 — 40		Loess.
		2 — 10		Drift.
		6 — 8		Lacustrine clay.
		8 — 20		Micaceous and ferruginous sandstone. "Merom Rock."
		3 — 6		Argillaceous limestone.
1.6		0 — 1	6	Rash COAL and slate.
		2 — 4		Fire clay.
28.		15 — 20		Siliceous shales and flagstones.
		5 — 4		Limestone, sometimes argillaceous.
.8		0 — 0	8	Rash COAL and slate.
		2	4	Buff-colored fire clay.
49.4		8 — 25		Siliceous shales and thin bedded sandstone.
		40 — 15		Quarry sandstone, buff.
		20 — 2		Siliceous shales. [ings.
		12 — 5		Clay shales with carbonaceous part.
		3 — 0		Black slate.
4.4		1 — 4	4	COAL N.
		4 — 2		Fire clay.
		20 — 12		Siliceous flagstones.

## CONNECTED SECTION—Continued.

SPACE.		Ft.	In.	
18.6		2 — 3		Ferruginous limestone.
		3 — 1		Calcareous and clay shale.
		0 — 0	6	Black slate.
2.6		0 — 2	6	COAL M.
		1 — 2	8	Fire clay.
		18—21		Argillaceous sandstone.
62.8		20		Siliceous shales and flagstones.
		5 — 14		Clay shale.
		10— 5		Soapstone with fossil plants.
10.9		3 — 10	9	COAL L.
		5		Fire clay.
		3		Soapstone.
		12—20		Soapstone and clay shale.
		12		Thin bedded sandstone.
		10		Siliceous flagstones and sandstone.
		5 — 9		Aluminous shale.
		2 — 4		Clay shale with iron nodules.
		2 — 3		Calcareo-magnesian limestone.
		2 — 3		Aluminous shale and ochre.
		2 — 3		Black bituminous sheety slate.
		1 — 0		Pyritous clod.
5.9		5	9	COAL K, from 2 to 10 ft. thick.
				Fire clay.
		5		

CONNECTED SECTION—Continued.

SPACE.		FT.	IN.	
79.3		20	-	Coarse, ferruginous laminated sand-rock.
		70—40		Massive conglomerate.
		5 —10		Gray aluminous shale.
		0 — 2		Calcareous shale.
		1 — 2	3	Black slate and cannel coal.
1.6		5 — 1	6	COAL A.
9.4		3	4	Fire clay.
		6		Siliceous shales and flagstones.
430.	Total.			

RECAPITULATION

SPACE.		Ft.	In.	
		84		Space.
		1	6	Rash COAL.
		28		Space.
			8	Rash COAL.
		49	4	Space.
		4	4	COAL N.
		18	6	Space.
		2	6	COAL M.
		62	8	Space.
		10	9	COAL L.
		72		Space.
		5	9	COAL K.
		79	3	Space.
		1	6	COAL A.
		9	4	Space.
	Total.	430	1	



The foregoing section and recapitulation give a general view of the rocks of Pike county, and represent the number and relative position of the coal seams as nearly as may be determined in their present undeveloped condition.

Coal A underlies the whole county, but outcrops only in ravines amongst the hills on each side of Patoka river, near the eastern border. Varying from one to four feet seven inches in thickness, it usually contains at least one stratum of about fourteen inches of good, compact, splinty cannel or block coal. Hard, free from dust, and rich in carbon, this stratum is suitable alike for parlor use or that of the blast furnace. When thickened to a much greater extent, it has been done at the expense of its more valuable qualities, and becomes impure and pyritous. This seam is often topped with a layer of pure, choice cannel coal from four to ten inches in thickness, and occasionally the black bituminous roof slate is replaced by a fair article of cannel coal, rich in gas. In such last mentioned banks, at the junction of the slate and cannel, are found casts of the horny-shelled *Lingula*, *Chonetes* and *Piscina* in good preservation; also faint impressions of *Productus Spirifer*, etc.; the thick calcareous material of the latter made soluble and wasted during the process of fermentation which occurred in the vegetable matter with which they were in contact prior to the change which formed coal.

The calcareous shales are pretty persistent, and are sometimes hardened into dark bituminous limestone, containing *Spirifer cameratus*, *S. lineatus*, *Productus punctatus*, *Nautilus decoratus*, *Orthoceras Rushensis*, fishbones and Crinoid stems.

The gray aluminous shales are highly charged with pyrite, (sulphuret of iron,) which, on exposure to the air, decomposes. This renders the whole stratum soft and friable, which, torn out by winter torrents, leaves spaces, roofed by the overlying sandstones, known as "rock houses."

The coarse ferruginous sand rock below coal K, is readily identified as the massive conglomerate. Although no pebbles are here present, it offers all the other character-

istic features of that group. It may be quarried in immense blocks. The quantity is unlimited. Endowed with a capacity to resist in a very great degree the action of heat and the variations of the atmosphere, this rock will be found a material of great value for the hammered masonry of foundations, piers, etc. By careful selection, stone of several different tints may be obtained, which will contrast with good effect in chiseled work. The upper member of this deposit is soft, coarse, and liable to disintegrate. The geological level of the silicious ores, so notable in counties to the north and east, is here but slightly charged with ores of iron. These rocks are a continuation of the conglomerate ridge which traverses Dubois county from east to west, south of the Patoka, and at its most westerly terminus passes beneath the surface a short distance northwest of Winslow.

Coal K is found high up on the sides of the hills and peaks which abound in the region of the conglomerate sandstone. Rapidly dipping to the north, south, and west, it as rapidly increases in thickness until, near the line dividing ranges seven and eight, it attains a generous width, ranging from five feet to nine feet seven inches at Dr. Posey's bank, section 15, township 1 north, range 8 west. To the east, this coal is somewhat splinty, but generally it is a fat, caking coal, rich in volatile matter, and on combustion leaves a red ash with some clinker, indicating the presence of sulphuret. On trial it has been found to be an excellent grate and steam coal, and is highly esteemed by blacksmiths. A stratum of black, sheety slate, from three to three and a half feet in thickness, overlies K, and forms an excellent roof. In the lower member of this slate are a great many large pyritous boulders or "pot-stones," some of large size and filled with marine fossils.

Still above this, and even more persistently accompanying K, is a band of limestone from two to three and a half feet thick. At the eastern side of the county it is tolerably pure and has been burned, furnishing a strong dark colored sample of lime. It contains the following fossils, viz.:

*Productus punctatus*, *P. semireticulatus*, *P. costatus*, *Spirifer eameratus*, *S. lineatus*, *Athyris subtilita*, *Pinnæ*, *Myalina*, *Allorisma*, *Discina* (large n. s.), *Nautilus decoratus*, *N.* (n. s.), and Crinoid stems. At Dr. Posey's bank and northeast from Pleasantville, this rock becomes sandy and at the same time highly magnesian, and in addition to the above list of fossils, contains *Gasteropods*, *Aviculopecten Providensis*, a *Phillipsia*, and *Chonetes mesoloba* in abundance.

The silicious flagstones and quarry sand rock is sometimes used for foundations and hammered masonry. Not of the best, it is only adopted when choice stone is not attainable.

Seam L is found capping the tops of the highest hills near Pikesville, and near the surface in the highlands east of Otwell, one and a half to two feet thick. From north to south through the center of the county, this seam has been almost wholly eroded. At Hathaway's, and Well's and Whitman's banks, one mile southwest of Winslow, it is seen again, and thence may be found with few interruptions to the western border, ranging in thickness from four to ten and a half feet. Throughout its whole extent, L is a gray or white ash caking coal, burning well in grates and steam furnaces, and will be found a choice fuel for locomotive and rolling mill use. L, as usual, is generally overlaid by clay shales and a thin bed of soapstone known as the "fern bed," containing many plant remains amongst which were noticed the following characteristic species: *Pecopteris arborescens*, *Neuropteris rarinervis*, *Annularia longifolia*, *Sphenophyllum Schlotheimii*, *Asterophyllites equisetiformis*, *Cordaites angustifolia*, *Paleoxylon*, *Lepidodendron elegans* and *Sigillaria reniformis*. A few points excepted, these shales are continued up to the next seam, and, although sometimes silicious and so compact as to seem to the quarryman enduring rock, yet on account of their aluminous nature they will on exposure to the elements soften and decompose.

Outcrops of seams M and N are found in the region about three miles west of the line dividing ranges 7 and 8, except in the southwestern part of the county where both are eroded. Soon after their first appearance, these

seams in the northern townships dip at the rate of from thirty to fifty feet per mile in a northwesterly direction; but to the west and southwest, in the same course, beyond Pleasantville, M is an inconstant, sulphurous seam and of little or no practical value. It is accompanied by an overlying bed of calcareous shale inclosing carbonates and sulphurets of iron. Above this is a ferruginous limestone of great persistence, from two to three feet thick, and containing a few indistinct Gasteropods, *Spirifer lineatus*, and *Chaetetes milleporaceus*, in thick layers. Generally this bed is highly ferruginous and will pay for transportation to iron furnaces as a rich flux.

Seam N is worked at two localities near Petersburg; at both of which places it is found in isolated knolls of no great extent. Hence, by exposure to air and moisture, it has been robbed of some of its gaseous properties. The coal is free from sulphur, burns with a clear flame, and leaves a white ash without clinker. In the western part of the county, where covered by heavy hills, it contains more volatile matter, and will furnish fair to good gas coal. Above N, occurs a bed of buff or yellow sand rock, of considerable persistence. It has been quarried near Centerville and Hawthorn, and will furnish large amounts of good stone.

The *rash coals* are not constant. They were not seen of workable thickness in this county; but the underclays and overlying limestones are of great persistence, and when by erosion of intermediate strata, as at "Snake Knob," in Warrick county, the two limestones are brought close together, they form a marked feature, capping the hills with a hard argillaceous clinking limestone, that has proven a bulwark against the currents of erosive rivers and the levelling power of the elements. These seams are believed to be the highest coals in the Indiana and Illinois coal fields.

Still above is found a bed of coarse, soft red sandstone, probably equivalent to the "Merom rock" in the geology of Sullivan county. (Ind. Report 1871.) For the present

it is included among the rocks of the coal measures, but facts not yet fully studied will, it is believed, assign this rock to a higher position and a later age.

The foregoing is a general outline; to this will now be added representative sections and details for local information.

#### LOCAL DETAILS.

The conglomerate spur which pierces the coal measures from the eastern side of the county terminates with abruptness. The strata dip rapidly and thus a line of precipitous bluffs formed a mural breakwater, upon and against the slopes of which the different coal seams were successively deposited.

Commencing at the highest known rocks, the following section, taken in section 7, township 1, range 9 west, Gibson county, at a point 235 feet above the Wabash, is given as a better showing of the upper strata than any seen in this county:

#### SECTION IN GIBSON COUNTY.

Loess and river sand.....	20 ft. 0 in.
Pebbly, fluvial drift .....	8 ft. 0 in.
Soft white and yellow sandstone.....	30 ft. 0 in.
Soft laminated sandstone.....	22 ft. 0 in.
Quarry sandstone, "Merom rock".....	18 ft. 0 in.
Calcareous and argillaceous shales, and lime rock.....	10 to 3 ft. 0 in.
Black bituminous slate .....	1 ft. 4 in.
<i>Rash coal</i> .....	8 in. 0 ft. 2 in.
Fire clay.....	2 ft. 6 in.
Clay shales.....	6 to 15 ft. 0 in.
Limestone, with Crinoid stems .....	2 to 4 ft. 0 in.
Clay shale.....	2 to 5 ft. 0 in.
Black slate.....	3 to 1 ft. 0 in.
<i>Rash coal</i> (reported).....	2 ft. 0 in.
	<hr/>
	134 ft. 0 in.

This section is interesting from the fact that the coarse, loose sandstone near the top may be traced almost continuously to the Wabash river in the vicinity of Hazleton. This shows the abruptness of the local dip in that direction and the great depth at which the lower coals must there be sought.

West of Centerville is a long ridge, which, at a height of 135 feet above Patoka, is covered with an ancient river sand-bar. This constitutes a warm loamy soil. Elevated above the region of sudden changes of temperature, it is to a great degree exempt from late frosts and invites the attention of fruit growers. The tender fruits are grown successfully. Pears ripen in perfection; and at the time of my visit the trees were breaking down with large, sweet red peaches. From the top of this hill, near Olive Branch Church, can be seen the spires at Oakland city, seven miles to the south, and other points ten miles away down and across Patoka valley.

That part of the connected section, from the rash coal down to coal N, gives an exhibit of the rocks in this neighborhood. A local section of coal N, the only seam here worked will be added.

#### SECTION AT FALL'S BANK.

Heavy bedded sandstone..... 10 to 20 ft. 0 in.

Calcareous and argillaceous clod. 14 to 0, ft. 7 in.

Coal N:

Slaty coal..... 2 ft. 4 in.

Pyritous partings. 3 in. to 1 in.

Choice caking coal 1 ft. 1 in.

Slaty pyritous coal 0 ft. 4 in.

3 ft. 10 in.

Fire clay to water.....

3 ft. 0 in.

27 ft. 5 in.

The upper division of this coal burns without clinker, and leaves a white ash. It is too splinty for blacksmiths' use. Outcrops or openings with an average thickness of three and a half feet were seen on the following lands, viz.:

Lewis Wilson, northwest quarter Sec. 13, T. 1 S., R. 9 W.  
 Lewis Wilson, southwest quarter Sec. 13, T. 1 S., R. 9 W.  
 R. Falls, N. W. qr. N. E. qr. Sec. 24, T. 1 S., R. 9 W.  
 W. Carr, N. E. qr. N. E. qr. Sec. 24, T. 1 S., R. 9 W.  
 Mr. Hellsby, south half Sec. 19, T. 1 S., R. 9 W.

Going east, the ferruginous limestone (iron ore) covering coal M, and sometimes the coal itself, may be seen almost connectedly from Dongola to the north side of township number 1 south, range 8 west. Large quantities have been thrown out in digging the canal north of Hosmer. This would be valuable as a flux for iron furnaces, enriched, as it is, with a very appreciable amount of iron. Thin outcrops of M are seen near and in the canal bed on sections 10, 22 and 27, township 1 south, range 8 west; none reported to be of workable thickness. Tradition, which could not be traced to a reliable source, reports coal L five feet thick in a sixty feet bore, near the base of "Slickum hill." This is the average space between L and M from neighboring localities, and to say the least, is probably correct.

On the road leading from Hosmer to Petersburg, seam N is worked on Hosea Alexander's land by H. Smith. The coal comes out in good sized blocks, has a glossy metallic lustre, burns with much flame and leaves a white ash with no clinker. Considerable quantities have been mined to supply mills and factories at Petersburg.

#### SECTION AT HOSEA ALEXANDER'S.

Silicious shale.....	6 ft. 0 in.
Compact soapstone.....	1 ft. 6 in.
Gray soapstone, "fern bed," with <i>Pecopteris arborescens</i> , <i>Neuropteris rarinervis</i> , <i>N. hirsuta</i> , <i>Sphenophyllum Schlotheimii</i> , <i>Asterophyllites longifolium</i> , <i>Calamites</i> , <i>Corduities borassifolium</i> , <i>C. angustifolium</i> , <i>Lepidodendron</i> , (—————), <i>Sigillaria</i> and <i>Stigmara</i> , abundant .....	2 in to 0 ft. 11 in.

## Coal N :

Laminated coal.....	0 ft. 6 in.	
Compact good coal.....	2 ft. 0 in.	
Parting blk. sulph..	3 in. to 0 ft. 1 in.	
Choice coal.....	2 ft. 0 in.	
		————— 4 ft. 7 in.
Fire clay, plastic.....	5 ft. 6 in.	
Fire clay with nodules and pebbles.....	1 ft. 2 in.	
		————— 19 ft. 8 in.

Outcrops of same were noticed on the adjoining lands, section 34, township 1 north, range 8 west, and section 4, township 1 south, range 8 west. More will be discovered in the adjacent knolls, but as this seam has suffered much from erosion the patches will be isolated and of no great extent.

Petersburg is pleasantly situated in the fertile valley of Prides creek, two miles south of White river. During the short life of the Wabash and Erie canal, it was the center of a large trade in dry goods, agricultural products, and coal. Since the canal was abandoned, the citizens have been compelled to look out for other means of transportation. High hopes are entertained of securing one of the proposed lines of railway, and thus surpass their former prosperity. Good crops of corn, wheat, oats, and grass are raised. Fruit is abundant and of superior quality. A few miles to the south, is an extensive grove of giant oaks and poplars. All offer paying inducements for railway construction.

In mineral wealth the neighborhood is still richer. At Sand Hill, two miles north of town, the following section was taken, where the ferruginous limestone overlying seam M may be seen dipping west toward "Rocky Ford" at the rate of sixty feet to the mile. It is probable that the dip is still greater in a direction a little north of west.



## SECTION AT SAND HILL.

Ancient river sand. ....	10 to 20 ft. 0 in.
Silicious shale.....	7 ft. 0 in.
Soapstone with <i>Pecopteris</i> , <i>Neuropteris</i> , <i>Asterophyllites</i> , <i>Cordaites</i> , and <i>Flabellaria</i> .....	0 ft. 6 in.
Coal N.....	3 to 4 ft. 4 in.
Fire clay.....	2 to 4 ft. 0 in.
Soapstone.....	8 ft. 0 in.
Silicious shale.....	2 to 12 ft. 0 in.
Ferruginous limestone, with <i>Productus punctatus</i> , <i>Spirifer lineatus</i> , <i>Cyathaxonia prolifera</i> , <i>Chaetetes milleporaceus</i> , <i>Athyris subtilita</i> , and <i>Gasteropods</i> .....	2 ft. 4 in.
Calcareous and pyritous clay.....	3 to 1 ft. 0 in.
Coal M :	
Slate and coal.....	0 ft. 6 in.
Pyritous and bituminous clay.....	0 ft. 8 in.
Caking coal.....	1 ft. 8 in.
	2 ft. 10 in.
Fire clay.....	8 ft. 0 in.
Sandstone .....	5 to 20 ft. 0 in.
Covered silicious flags and shales... (Low water in White river.)	20 ft. 0 in.
Soapstone.....	10 ft. 0 in.
Coal L (reported).....	8 ft. 0 in.
	127 ft. 4 in.

The strong dip mentioned before would, in reverse, carry all these coals above the surface at Petersburg; and hence we find they have all been eroded with a possible exception of L at a few isolated points. Borings for water at several wells in town have, according to report, found coal, or a

black slate filled with bowlders similar to the roof-rock overlying coal K. A shaft and bore near the woolen mill in the southwest part of town, is reported to have found coal K ten feet thick, with the following exhibit:

SECTION IN PETERSBURG.

Soil and clay.....	28 ft. 0 in.
Shelly stone.....	10 ft. 0 in.
Slate and bowlders.....	2 ft. 0 in.
Coal K.....	10 ft. 0 in.
Fire clay to bottom.....	2 ft. 0 in.
	<hr/>
	52 ft. 0 in.

Going northeast on the Washington road, we ascend to the elevated ridge bordering White river. Near the summit, about one hundred and thirty feet above low water, coal L one and a half feet thick was found in digging wells on the lands of J. Vaughn and S. Mafflety, not more than eighteen to twenty feet under the surface, with seam K thirty to fifty feet below in ravines. The strata probably dip from this place in every direction, as may be learned from disconnected exposures. A deep bore would definitely settle some doubtful points.

Two miles north of Petersburg, on Lick and Muddy creeks, and between them, coal K is magnificently developed—A crowning effort of the carboniferous age. The solid coal ranges from five and a half to over nine feet on Dr. Posey's land, section 12, township 1 north, range 8 west. A man six feet high can generally walk erect in Posey or Shandy's mines and have considerable space overhead. The seam furnishes a rich, gaseous, caking coal, which burns with much flame and leaves a red ash with some clinker. It is a good coal for steam or grate use, and is sought after and hauled long distances by blacksmiths. The following section, taken at Dr. Posey's mine, section 13, township 1 north, range 8 west, gives a general view of the neighboring exposures, except that the overlying limestone is purer and

thinner in some localities, and at others highly ferruginous and compact; at Shandy's bank the seam is not so distinctly laminated, and the coal is more homogeneous :

SECTION AT DR. POSEY'S MINE.

Sandstone.....	5 to 20 ft. 0 in.
Magnesian, limestone with <i>Productus punctatus</i> , <i>P. semireticulatus</i> , <i>P. costatus</i> , <i>Discina</i> (n. s.) <i>Spirifer cameratus</i> , <i>S. lineatus</i> , <i>Allorisma</i> , <i>Astartella</i> , <i>Nautilus decoratus</i> , <i>Aviculo-pecten Providensis</i> , <i>Lingula</i> , and Crinoid stems.....	4 ft. 0 in.
Ferruginous limestone.....	3 to 1 ft. 4 in.
Dark pyritous argillite filled with <i>Productus</i> , <i>Chonetes</i> , <i>Cephalopods</i> , and <i>Gasteropods</i> , in confused pockets.....	2 to 0 ft. 0 in.
Black sheety slate with pyritous ironstone boulders from one to five feet in diameter.....	5 ft. 0 in.
Coal K : Thin bedded, often cannel .....	0 ft. 6 in.
Steam coal.....	1 ft. 10 in.
Parting of black sulphur.....	0 ft. 1 in.
Good steam coal.....	2 ft. 4 in.
Parting (pyritous).....	0 ft. 2 in.
Smiths' coal.....	1½ to 2 ft. 4 in.
Grate coal (pyritous).....	1 ft. 0 in.
	8 ft. 3 in.
Stigmarial fire clay.....	5 ft. 5 in.
	44 ft. 0 in.

The great iron boulders or "pot stones" fall down from the roof, after exposure, and hundreds of tons could be  
G. R.—17

obtained here. I suggest to iron makers the feasibility of separating the sulphur on the spot by roasting with refuse coal, and in this way secure a large quantity of iron at little cost. Decomposition of the pyritous and aluminous shales produce quantities of alum and copperas in Dr. Posey's mine. At an early day copperas was here manufactured for home use, one gallon of water leached from the mine yielded one pound of that salt.

In the older part of this mine, long ago exhausted, owls and great flocks of bats have taken up their quarters. Back in the ghastly twilight one will be surprised to find that the old timbers and props have seemingly come to life again. They have sent out strange twisted and forked branches, some white, others gray or dusky, and all decked with globules of condensed water, which sparkle like diamonds. Some of these fungi were two feet long and presented a never ending medley of grotesque unsymmetrical forms. The timbers were often coated with patches of a leathery white substance, which probably at a time of greater darkness would blaze with phosphorescent light (fox-fire).

Coal K has been worked or opened in this vicinity as follows, viz.:

Dr. Posey, 4 drifts, Sec's 12 and 13 T. 1 N., R. 8 W.

Shandy, shaft and slope, Sec. 13, T. 1 N., R. 8 W.

Holloway, drift, Sec. 18, T. 1 N., R. 7 W.

Bennett, drift, Sec. 7, T. 1 N., R. 7 W.

Adams, drift, Sec. 7, T. 1 N., R. 7 W.

Hawthorn, drift, Sec. 7, T. 1 N., R. 7 W.

Hawthorn, shaft to L (?), Sec. 7, T. 1 N., R. 7 W.

DeBruler, northwest quarter Sec. 8, T. 1 N., R. 7 W.

Case, (reported), Sec. 20, T. 1 N., R. 7 W.

Dr. Posey's bank has been worked over twenty-five years. About four acres have been exhausted supplying the demand of local market and smith-shops for a region twenty miles around, and for shipment by canal and river to Evansville, Mount Carmel, Graysville and New Harmony. The

proprietor estimates that over one million bushels have been sold.

From the Posey and Shandy mines, southeast quarter section 13 township 1 north, range 8 west, coal K dips rapidly to the northwest. Near the river flats, a test shaft was put down to the coal at a considerable depth below the surface. Along the canal and bank of the river, in northwest corner of section thirteen, is a band of ferruginous limestone, with *Chaetetes milleporaceus*, exactly similar to the bed overlying M at all other points. A seam of coal similar to the general aspect of M is present, while below in the river, with the usual space (sixty-two feet) intervening, is a coal, according to descriptions furnished me, exactly analagous with L. This requires a sudden and rapid dip of strata to the northwest, of not less than one hundred feet to the mile. A dip of such intensity is barely possible. Hence more exact data are necessary before positive determinations can be made.

At DeBruler's bank, northwest quarter section 8, township 1 north, range 7 west, the roof slates afford a variety of fossils, viz.: *Productus*, *Chonetes*, *Discina*, *Bellerophon*, *Macrocheilus* and *Pleurotomaria*, some represented by several species.

#### SECTION OF DE BRULER'S COAL.

Fat cannel-like coal.....	0 ft. 4 in.
Steam coal.....	3 ft. 0 in.
Sulphur parting.....	.....
Good bituminous coal.....	1 ft. 5 in.
Parting.....	.....
Choice bituminous coal .....	1 ft. 0 in.
Rash coal.....	1 ft. 8 in.
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7 ft. 5 in.	

Rhoads & Hawthorn's bank, on the west half northwest quarter section 7, township 1 north, range 7 west, was once worked extensively and the product shipped by canal.

The seam averages 5 feet, and is a good sample of caking coal. At one time the canal broke opposite this bank, and exposed beneath its bed a ledge of coal reported to have been six or seven feet thick, fifteen feet below the upper seam. Whether a lower seam or a fallen ledge of K, there was no evidence to determine.

Ascending White river, we find, on section 4, township 1, north, range 7 west, an ancient sand-bar, high up on the river bluffs, cut through by the "Straight Line Railroad," showing a thickness of twenty-four feet. In section 10, on lands of C. White, the same company quarried an amount of stone sufficient for the high piers necessary to bridge the river. This material has been lying here exposed to frost and air for a period of sixteen years. It weathers well. The bed of sandstone quarried here, at McCain's, Postlewait's, and Crowe's, is compact, splits readily, and chisels well. Generally the material overlying coal L is too argillaceous to be valuable for building purposes. This is exceptional, and was evidently compacted by currents of water powerful enough to transport the coarse sands of which it is composed. As is usual in such cases, we find the underlying coal thin and partially eroded by said currents.

Coal has been worked to a very considerable extent on John Crowe's farm, section 10, township 1 north, range 7 west. Quantities have been exported by flat-boats on the river. It is a choice caking coal, burns with white flame, runs together but little, and leaves a white ash without clinker. It is so free from sulphur that a quantity which had been exposed to the weather "in stock" for six months, showed no efflorescence of copperas.

#### SECTION AT CROW'S.

Slope.....	.....
Sandstone, soft and coarse.....	11 ft. 0 in.
Sandstone, thin bedded.....	12 ft. 0 in.
Clay shale and soapstone.....	9 ft. 0 in.
Coal L? .....	3 ft. 6 in. .

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Fire clay.....	3 ft. 9 in.
Covered.....	50 ft. 0 in.
Hard sandstone .....	1 ft. 6 in.
Soapstone, with iron nodules contain- ing zinc blende.....	5 ft. 0 in.
Flagstones and ferruginous limestone..	12 ft. 0 in.
Coal K ? in White river.....	? ft. ? in.
	<hr/>
	107 ft. 2 in.

Continuing up the river, we find bluffs capped with fluvial sands one hundred to one hundred and thirty feet above the channel. On G. W. Daily's land, southwest quarter, northeast quarter section 13, township 1 north, range 7 west, is the following outcrop:

SECTION ON DAILY'S FARM, Highbanks.

White fluvial sand with shells.....	33 ft. 0 in.
Red clay, modified drift.....	8 ft. 0 in.
Blue potters' clay—glacial drift ? with trunks of trees and vines.....	10 ft. 0 in.
Soft disintegrating sandstone..... ..	11 ft. 0 in.
Coal, rash.....	0 ft. 5 in.
Clay parting.....	0 ft. 1 in.
Coal, good.....	1 ft. 6 in.
Coal, rash.....	0 ft. 2 in.
	<hr/>
	2 ft. 2 in.
Stigmarial clay.....	5 ft. 0 in.
	<hr/>
	69 ft. 2 in.

Coal in this vicinity outcrops, or has been worked as follows, viz.:

Thomas Crowe's, north half section 10, T. 1 N., R. 7. W.  
 Clint White, N. W. qr. S. E. qr. Sec. 10, T. 1 N., R. 7 W.  
 McCanes, northwest quarter Sec. 24, T. 1 N., R. 7 W.  
 G. W. Daily, northeast quarter Sec. 13, T. 1 N., R. 7. W.  
 J. Hancock's, S. half N. W. qr. Sec. 18, T. 1 N., R. 6 W.

J. Mitchell, S. E. qr. S. E. qr. Sec. 7, T. 1 N., R. 6 W.  
 Gray, north east quarter Sec. 19, T. 1 N., R. 6 W.  
 T. Case, northwest quarter Sec. 19. T. 1 N., R. 6 W.

South of Highbanks, on the way to Otwell, in section number 30, where the road crosses a branch flowing into Rocky run, numerous sink holes or conical pits were noticed. The branch had cut down to a stratum of impalpable quicksand. Here, in past time, herds of buffalo would gather to wallow in the fine sand and dust, as their descendants still do in the dust "wallows" of western Kansas. Well worn trails or paths of an ancient date, were noticed leading to this favorite resort.

Otwell is a vigorous young town. It is situated in the center of a level tract of land which extends some twenty miles from east to west, about half as wide as it is long, and is one hundred and ten feet above White river. The soil is black or gray. Beneath, in digging wells, beds of clay inclosing fragments of wood, alternate with bands of fine sand, inducing the belief that this was once the bottom of a lake. The present growth of timber is generally young, showing that not many years ago this area was a prairie.

Three mounds, a short distance north of the village, are probably artificial and relics of the "Mound Builders." Time did not allow an examination.

South of Otwell, in section 20, township 1 south, range 6 west, Mr. Wm. Davenport reports finding a log of sweet gum (liquidambar) in a well forty-eight feet below the surface.

#### DAVENPORT'S WELL.

Soil and modified loess.....	5 ft. 0 in.
Yellow and red clay.....	6 ft. 0 in.
Blue clay with layers of sand.....	30 ft. 0 in.
Blue clay inclosing drift wood.....	2 ft. 0 in.
Blue mud and sticks.....	7 ft. 0 in.
	<hr/>
	50 ft. 0 in.



At nearly an equal depth on an adjoining farm was found a black walnut log. These trees are still natives.

In the Davenport neighborhood the coal seams were not being worked. They were reported as furnishing a fair article of coal, with thickness varying from one to two and a half feet. The different localities are marked on the map. I was told that the coal formerly worked on Demette farm, northwest quarter section 27, township 1 south, range 6 west, and dug to in a well on Trayler's land, section 2, township 1 south, range 7 west, was at each of these places over four feet thick.

A small seam near the top of the hills is referred to L. Commencing thirty-five feet below this, Mr. J. Dillon dug and bored, on southeast quarter southwest quarter section 28, township 1 south, range 6 west, and, at a depth of thirty-five feet below, found K; thus determining the space between at seventy feet. Just above the lower coal, his auger passed through a layer of "very hard stone," supposed to be the cherty lime rock over K, which crops out in Flat creek two miles below. At one opening on this farm L is reported to be five feet thick.

The "White Sulphur Springs," Captain J. F. Townsend, proprietor, situated on the northwest quarter section 33, township — south, range — west, flow out at crevices in the limestone roof of coal K. The water has the medicinal qualities peculiar to white sulphur springs. It has been found to be a specific in many chronic diseases. Comfortable quarters are fitted up in which to entertain invalids. On the same farm, Captain Townsend has worked seam K, having a thickness of two feet eight inches. The coal is sulphurous.

South and west of the "sulphur springs," K rapidly mounts the conglomerate ridge. Seam A. (or possibly a seam intermediate between K and A) is found in the valleys and ravines. It yields a rich, glossy-black coal, breaking with splintery fracture, and free from dust. The overlying roof-slate is highly bituminous. At several localities it changes into a laminated cannel coal, which is rich in gas

and burns with a flame of great volume. If transportation was convenient this cannel coal would be valuable to the gas maker, and for torches, kindlings, etc., etc. One of the best exposures is here added, taken on the land of G. W. Thomas, southeast quarter section 31, township 1 south, range 6 west.

#### SECTION AT THOMAS' MILL.

Slope, covered.....	
Soft laminated sandstone.....	8 ft. 0 in.
Silicious and argillaceous shale.....	4 ft. 10 in.
Blue clay shale.....	0 ft. 6 in.
Dark slate, with scales, teeth, and spines of <i>Petrodus occidentalis</i> , and <i>Discina</i> ..	1 ft. 6 in.
Black bituminous sheety slate.....	0 ft. 10 in.
Cannel coal.....	1 ft. 1 in.
Hard coal, some sulphur.....	2 ft. 0 in.
	—————3 ft. 1 in.
Fire clay, to branch.....	5 ft. 3 in.
	—————
	24 ft. 0 in.

The cannel coal and bituminous slate above contains leaves, stems, and stalks of ferns, *Cordaitea borassifolia*, *Lingula umbonata*, and *Discina nitida*, with a few fragments of Crinoid stems and of *Productus*.

In the region between Flat creek and Patoka river, coal seams are visible or have been worked at the following localities, viz. :

Anderson's, northeast quarter Sec. 27, T. 1 S., R. 6 W.  
 DeMotte's, northwest quarter Sec. 27, T. 1 S., R. 6 W.  
 Davenport's, south half Sec. 27, T. 1 S., R. 6 W.  
 Rodarnell, northwest quarter Sec. 28, T. 1 S., R. 6 W.  
 Dillon, southwest quarter Sec. 28, T. 1 S., R. 6 W.  
 Townsend, northwest quarter Sec. 33, T. 1 S., R. 6 W.  
 Carpenter, northeast quarter Sec. 31, T. 1 S., R. 6 W.  
 G. W. Thomas, southeast qr. Sec. 31, T. 1 S., R. 6 W.  
 Taylor & Davis, Sec. 25, T. 1 S., R. 7 W.

Garrison, northwest quarter Sec. 4, T. 2 S., R. 6 W.  
Davidson, southwest quarter Sec. 4, T. 2 S., R. 6 W.  
Taylor, northeast quarter Sec. 8, T. 2 S., R. 6 W.  
Wolfe, southwest quarter Sec. 8, T. 2 S., R. 6 W.  
Case, northeast quarter Sec. 17, T. 2 S., R. 6 W.  
"Copperas factory," N. W. qr. Sec. 18, T. 2 S., R. 6 W.

These coals rarely attain a thickness of more than two and a half feet except at localities heretofore mentioned.

"Miller's Ague Spring," section 5, township 1 south, range 6 west, is locally known as a "cure" for that disease. The waters are a saline chalybeate, flowing out of ferruginous beds of sandstone. Their qualities are highly esteemed by those who have tried them.

"Milburn's Spring," T. C. Milburn, proprietor, situate on southeast quarter section 35, township 1 south, range 7 west, has a high reputation in that vicinity as a remedy for diseases of the stomach, bowels, kidneys and of the skin. It is generally known as "the ague cure," but is reputed as still more efficacious in derangements of the liver and digestive organs. Many certificates from reputable persons indicate especial virtue in cases of gravel and rheumatism. At the time of my visit not less than twenty persons were drinking the water, and it was being hauled away so extensively as to almost exhaust the receiving cask. It contains salts of soda, magnesia and iron, with traces of bromine and arsenic.

The spring flows out at about the level of coal K, the shales and roof stones of which are near by. Beneath, the ferruginous and massive conglomerates are seen, and are well developed. A short distance to the west, this rock is suddenly depressed below the surface within the space of a quarter of a mile, and we find a mass of shales and soapstones thrown against and upon the tilted strata of sand rock. In a field adjoining the spring were found some good casts of *Calamites*, *Sigillaria* (3 Sp.), *Lepidodendron*, (2 Sp.) and *Trigonocarpum olivæformis*. Indications of coal K were noticed in ravines, but no openings were visible.

At Winslow, coal K is well developed, and has long been worked to supply mills and forges. It is a caking coal, good for steam use, and, by selecting the upper or lower divisions, furnishes an article pretty free from sulphur and well liked by blacksmiths. Moulton's bank is worked at two openings, with four other outcrops on the same section 28, township 1 south, range 7 west.

#### SECTION AT MOULTON'S BANK.

Slope, thin to heavy sandstones.....	40 ft. 0 in.
Limestone.....	1 ft. 8 in.
Calcareous shale.....	4 ft. to 0 ft. 0 in.
Black sheety slate with iron stones.....	2 ft. 4 in.
Coal K :	
Good blacksmith coal.....	1 ft. 0 in.
Steam coal, pyritous part's..	4 ft. 7 in.
Good blacksmith coal.....	1 ft. 0 in.
	————— 5 ft. 7 in.
Fire clay.....	3 ft. 5 in.
	————— 53 ft. 0 in.

At this mine, the seam rises to the east one foot in a distance of forty feet ; and dips at the same rate to the west.

Thomas' bank, on the Crowe estate, south half southwest quarter section 29, township 1 south, range 7 west, was also being mined. The dip here was west southwest at the rate of fifty feet to the mile.

#### SECTION AT F. THOMAS' BANK.

Slope .....	.....
Limestone with <i>Productus</i> and <i>Spirifer</i> ...	1 ft. 3 in.
Calcareous clay.....	1 ft. 6 in.
Black bituminous sheety slate.....	1 ft. 8 in.
Coal K :	
Good smiths' coal.....	1 ft. 2 in.
Steam coal.....	1 ft. 6 in.
Caking coal.....	1 ft. 6 in.
	————— 4 ft. 2 in.
Fire clay.....	3 ft. 5 in.
	————— 12 ft. 0 in.

I am indebted to Mr. Charles DeBruler for much information as to these coals, and also about outcrops on sections 20, 21, 22 and 32, which were covered and not visible; the reported thickness varying from three to five feet.

In part the flora and fauna of this vicinity are sub-tropical in their affinities. Persimmon bush and sweet gum are common. Canebrakes formerly existed. Tobacco grows well. Mr. DeBruler, a few years ago met and killed two black "cotton-mouth" snakes north of Winslow, and Mr. Corn, a few miles southeast, captured another. They were of a mottled, rusty, yellow color above, copper colored beneath, and clear white about and under the mouth.

South of Winslow coal outcrops, or has been discovered in wells, as follows, viz.:

	THICKNESS.	
	Ft.	In.
Wells & Whitmen, L, Sec. 1, T. 1 S, R. 8 W .....	4	8
Unknown, K, Sec. 2, T 1 S., R. 8 W .....	3	9
Hathaway, L, Sec. 6, T. 1 S., R. 7 W .....	(?) 4	0
On line of L. and St. L. R. R.:		
Thomson, L(?), S. E. qr. Sec. 13, T. 2 S, R. 8 W .....	3	0
Skinner, K, W. half Sec. 18, T. 2 S., R. 7 W .....		
———, K, N. W. qr. Sec. 18, T. 2 S., R. 7 W .....		
Pancake, K, N. W. qr. Sec. 17, T. 2 S., R. 7 W .....	?	2
Beer, K, S. W. qr. Sec. 17, T. 2 S., R. 7 W...represented	3	6
Ashby, K, N. E. qr. Sec. 17, T. 2 S., R. 7 W. represented	4	0
Morgan, K, S. W. qr. Sec. 17, T. 2 S., R. 7. W. represented	3	0
Beech, K, W. half Sec. 21, T. 2 S., R. 7 W...represented	3	6
Wilder, K, S. W. qr. Sec. 21, T. 2 S., R. 7 W. represented	3	0
White heirs, A, S. E. qr. Sec. 16, T. 2 S., R 7 W .....	4	7
Corn, A, S. W. qr. Sec. 15, T. 2 S., R. 7 W .....	4	0

Wells and Whitman's bank has been considerably worked for local use. The product is a light caking coal, free from sulphur, which burns with a white flame, leaving a gray ash and no clinker.

## SECTION AT WELLS AND WHITMAN'S BANK.

Silicious shales, with carbonaceous and clay partings.....	12 ft. 0 in.
Soapstone fern bed, with <i>Neuropteris rarinervis</i> , <i>N. hirsuta</i> , <i>N. Collinsii</i> , <i>Alethopteris Serlii</i> , <i>Pecopteris arborescens</i> . <i>P.</i> (——) <i>Cordaites</i> , and <i>Calamites</i> .....	0 ft. 8 in.
Coal L:	
Slaty coal.....	0 ft. 4 in.
Pure laminated.....	0 ft. 6 in.
Cubic, gas coal.....	1 ft. 2 in.
Choice angular bright.....	2 ft. 8 in.
	————— 4 ft. 8 in.
Fire clay, dark bituminous.....	0 ft. 9 in.
Fire clay, white stigmarial.....	4 ft. 3 in.
Soapstone, with calcareous balls and bands. ....	2 ft. 3 in.
Soapstone and silicious shales .....	12 ft. 0 in.
	—————
	36 ft. 7 in.

Hathaway's bank, section 6, township 1 south, range 7 west, was not opened, but from weathered fragments and accompanying material, the coal was very similar to Wells and Whitman's. From this point west, seam L is probably persistent along the line of the Louisville and St. Louis Railroad. To the east, coal L has been eroded, and was not seen again until met on the highest hill tops at Pikesville, one hundred and eighty feet above Hathaway's. This shows the amount of erosive power necessary to remove the absent strata in the intervening area, and also the rapidity with which this seam ascends to the highlands.

The coals K, on the head of Barren creek, were not visible and could not be measured. They are reported as varying from two and a half to four feet. The only measurement possible was taken near the quarter post between sections 17 and 20, where the thickness was less than two feet.

Many outcrops of A are found down in ravines bordering the Patoka, in the northeast part of township 2 south, range 7 west. Generally the seam is thin ; but at several localities it is widened up by layers of coal, separated by clay or slaty partings, which indicate that the upper divisions have been transported from other localities. The following, taken on White's land, north half southeast quarter section 16, township 2 south, range 7 west, begins under the "rock house" sand rock :

SECTION AT WHITE'S BANK.

Aluminous shale.....	10 to 15 ft. 0 in.
Black sheety slate.....	1 ft. 10 in.
Coal A :	
Splinty coal, with clay and slate parting.....	3 ft. 4 in.
Good splinty cannel. ....	1 ft. 3 in.
	<hr/>
	4 ft. 7 in.
Fire clay.....	5 ft. 0 in.
	<hr/>
	26 ft. 5 in.

A natural bridge on Jackson Corn's land, southwest quarter southeast quarter section 16, township 2 south, range 7 west, is formed by a small branch passing beneath a ledge of "rock house" sandstone. It is symmetrical, thirty feet long, ten feet wide with a chord of twenty feet.

Coal A is found on adjoining land below the water level.

SECTION AT CORN'S.

Slope .....	.....
Coarse, soft disintegrating sand- stone.....	10 to 30 ft. 0 in.
Massive sandstone with "rock houses".....	50 ft. 0 in.
Aluminous shale.....	10 to 15 ft. 0 in.
Black sheety slate.....	2 ft. 0 in.
Coal A.....	4 ft. 6 in.
	<hr/>
	101 ft. 6 in.

Pikesville is located on high land geologically, as well as topographically. Coal L is found in wells near the surface, K crops out on the side hill, and the place of A is but little below the level of low water in Patoka river. The following approximate section was taken by barometric measurement:

## SECTION AT PIKESVILLE.

Soil and loess loam.....	20 ft. 0 in.
Silicious shale and soapstone.....	18 ft. 0 in.
Coal L.....	1 ft. 6 in.
Fire clay.....	3 ft. 0 in.
Silicious and clay shale.....	30 ft. 0 in.
Ochre and black slate.....	3 ft. 0 in.
Coal K.....	1 to 3 ft. 0 in.
Laminated sandstone.....	20 ft. 0 in.
Massive sandstone.....	60 to 40 ft. 0 in.
Aluminous shale in Patoka river (estimated).....	10 to 30 ft. 0 in.
Place of coal A.....	.....
<hr/>	
168 ft. 6 in.	

A spring flowing out near the roof slate of coal K in the northern part of the village, is locally known as an "ague cure." The water contains sulphates of iron, alumina and perhaps magnesia.

East and southeast from Pikesville, we find a succession of hills and deep narrow ravines. Coal L is rarely met with. K soon mounts to the hill tops, and at the dividing ridge between Patoka and the Ohio runs out or is eroded. A is found near the water level in the deep valleys. Intermediate between K and A, the conglomerate sandstone is well developed. The upper division, coarse and disintegrating, is sometimes sufficiently compact to furnish grindstones of excellent quality, as on the north half section 28, township 2 south, range 6 west. The "massive division" from sixty to eighty feet thick is often precipitous, and on north half section 28, the underlying aluminous shales have



been excavated by Rocky (or Paint) creek, so as to form "rock houses;" one of which has a sufficient capacity and was often used as a shelter by a small tribe of Indians. In this cave were found a number of incipient "Indian mortars"—round cavities drilled into the solid rock by pebbles from the upper stratum agitated by drops of water trickling from the roof-stones.

SECTION ON J. CASE'S LAND, NORTHWEST QUARTER SECTION  
28, TOWNSHIP 2 SOUTH, RANGE 6 WEST.

Slope .....	.....
Massive sandstone.....	60 ft. 0 in.
Aluminous shale, "rock houses".....	8 ft. 0 in.
Soapstone.....	3 ft. 0 in.
Limestone.....	0 ft. 8 in.
Black slate .....	2 ft. 0 in.
Coal A :	
Compact splinty cannel.....	1 ft. 1 in.
Block coal.....	0 ft. 5 in.
	————— 1 ft. 6 in.
Fire clay to Rocky creek.....	3 ft. 6 in.
	————— 78 ft. 8 in.

Near the southeast corner of section 28, township 2 south, range 6 west, Dr. DeTar, and other citizens, have made examinations, and found an excellent article of cannel, superior to any that I have seen in the State. The seam is eight inches thick, resting upon another of bright, compact, semi-block coal, one and a half feet thick. This last will pay all expenses for mining, and leave the cannel as clear profit. The roof is a highly bituminous cannel-like slate, which on further exploration may answer for many uses to which cannel coal is devoted. On failure of the Pennsylvania wells, coal oil may be distilled from this slate at a cost not exceeding fifty cents per gallon.

## SECTION AT DE TAR'S BANK.

Loess .....	25 ft. 0 in.
Slope, covered.....	50 ft. 0 in.
Massive sand rock.....	45 ft. 0 in.
Aluminous shale with iron nodules.....	16 ft. 0 in.
Ferruginous limestone.....	1 ft. 1 in.
Ochre.....	0 ft. 10 in.
Black cannel-like slate.....	2 ft. 0 in.
Coal A :	
Choice cannel coal.....	0 ft. 8 in.
Bright compact splinty-	
cannel.....	1 ft. 1 in.
Block coal.....	0 ft. 6 in.
	<hr/> 2 ft. 3 in.
Fire clay to Rocky run.....	2 ft. 6 in.
	<hr/> 134 ft. 8 in.

The above cannel coal is rich in volatile matter, burns with a great volume of flame, does not snap as cannel slates usually do, but leaves a considerable amount of white ash. An outcrop, a short distance southeast from Dr. DeTar's bank, indicated that another coal seam at least one and a half feet thick there existed between K and A, and about thirty feet above the latter. The connecting strata could not be seen, and consequently nothing more than a probability can be expressed. This is sustained by the fact, that in Warrick, near the southwest corner of Pike county, such a state of affairs does exist.

In the valley of Cup creek, coal has been mined to a small extent at several banks. The thickness ranges from two to five and a half feet, and averages two feet four inches.

## COAL NEAR PIKESVILLE.

		THICKNESS.	
		Fl.	In.
In the village.....	L	1	6
Stephens, Sec. 20, T. 2 S., R. 6 W.....	L ?	1	4
Miller, Sec. 21, T. 2 S., R. 6 W.....	L ?	0	8
Miller, Sec. 21, T. 2 S., R. 6 W.....	K	1	7
Case, Sec. 28, T. 2 S., R. 6 W.....	A	1	6
Unknown, W. half Sec. 28, T. 2 S., R. 6 W.....	A	2	0
DeTar, S. E. qr. Sec. 28, T. 2 S., R. 6 W.....	A	2	3
Todrank, N. E. qr. Sec. 30, T. 2 S., R. 6 W.....	K ?	.....	.....
Boling, S. W. qr. Sec. 30, T. 2 S., R. 6 W .....	.....	.....	.....
Spradley, W. half Sec. 27, T. 2 S., R. 6 W. (rep'd)	K	2	6
Stone, S. W. qr. Sec. 27, T. 2 S., R. 6 W .....	.....	.....	.....
Powers, S. W. qr. Sec. 24, T. 2 S., R. 7 W. (rep'd)	K	3	0
Miller, S. E. qr. Sec. 24, T. 2 S., R. 7 W.....	K	.....	.....
Abshire, N. E qr. Sec. 25, T. 2 S., R. 8 W. (rep'd)....	K	2	0
Dutton, S. W. qr. Sec. 25, T. 2 S., R. 7 W.(rep'd)...	K	2	4

These coals are generally semi-block, with partings often half a foot or more in thickness of good block coal. The thin seams are pure; where thickened are usually pyritous.

Stendal was named by the Rev. W. Baumeister after his native city the capital of the province of Altmark, Prussia. It is situated upon a narrow ridge or "backbone" which separates the valley of Cup creek from the basin of South Patoka. This ridge, commencing near Winslow, continues in a south westerly direction beyond Stendal to the southern boundary of the county in almost a direct line, and is nearly the western margin of the conglomerate. It was the ancient Indian war path leading from the upper Wabash to the Ohio near Troy. When first visited by white men, this trail was distinct and beaten as if it had been long and much used. By it one may traverse this wild and hilly region on a level road or highway from one hundred and twenty to two hundred and ten feet above the adjoining water beds. On the farm of Mr. Baumeister, northeast quarter section 11, and northwest quarter section 12, town-

ship 3 south, range 7 west, are frequent outcrops of seam K well up to the top of the hills. The coal is block, but only a few inches thick. The black slate above K is rich in fish remains, amongst which were found *Petrodus occidentalis*, (teeth, scales and spines,) fish bones and coprolites, and fragments of a buckler-headed crustacean. The decomposed pyritous nodules and limestones, parting with their excess of sulphur, have formed several sulphates which are seen on the slope below, viz.: copperas, sulphate of lime crystallized, and also a fine clay, beautiful as meerschaum, which roasted, leaves a pure clear white residuum. To the east of Stendal the country is a succession of valleys and hills supported by the "massive" sand rock. Below, near the level of the streams, coal A is found. This sand rock has all the good qualities necessary to insure a large industry in quarrying and preparing blocks for building, when a demand for fire proof material of great endurance arises.

Near the southeastern corner and generally along the southern boundary of the county, the strata dip rapidly toward the Ohio river. Coal K soon approaches and then passes under the level of the streams. Here another seam comes in a few feet below K, between that seam and A, as may be seen by the following section, taken on the Beardsly farm, section 29, township 3 south, range 6 west, in Warrick county, and about a mile south of the county line :

#### SECTION AT BEARDSLY'S BANK, WARRICK COUNTY.

Thin bedded sandstone.....	10 ft.	0 in.
Ferruginous limestone.....	1 ft.	0 in.
Aluminous shale.....	4 ft.	0 in.
Dark shale.....	1 ft.	8 in.
Black slate with fish remains and <i>Pleurotomaria carbonaria</i> , <i>Macrocheilus paludinaeformis</i> , <i>M. primogenius</i> , <i>M. fusiformis</i> , <i>Petrodus occidentalis</i> , <i>Orthoceras Rushensis</i> , <i>Aviculopecten rectilateraria</i> , and <i>Chonetes mesoloba</i> .....	0 ft.	6 in.

Black slate filled with large bowlders or "pot-stones" containing <i>Edestus vorax</i> , <i>Allorisma</i> —————, <i>Nautilus decoratus</i> , <i>N.</i> (sp.), <i>Bellerophon carbonarius</i> , <i>B. percarinatus</i> , <i>Cyathaxonia prolifera</i> , <i>Chonetes</i> (2 sp.), <i>Productus semireticu-</i> <i>latus</i> , <i>Spirifer cameratus</i> , <i>S. lineatus</i> , etc., etc.....	0 ft. 10 in.
Coal K, caking.....	1 ft. 8 in.
Fire clay.....	4 ft. 0 in.
Soapstone and shale with iron nodules.	4 ft. 2 in.
Coal (I ?) pyritous.....	2 ft. 2 in.
Fire clay.....	3 ft. 0 in.
	<hr/> 33 ft. 0 in.

## COAL NEAR STENDAL.

Martin, S. E. quarter Sec. 4, T. 3 S., R. 6 W.  
 Hillmyer, S. E. quarter Sec. 9, T. 3 S., R. 6 W.  
 ———, N. E. quarter Sec. 8, T. 3 S., R. 6 W.  
 Sakel, west half Sec. 8, T. 3 S., R. 6 W.  
 Myer, S. W. quarter Sec. 7, T. 3 S., R. 6 W.  
 Bartle, N. W. quarter Sec. 18, T. 3 S., R. 6 W.  
 Fark, S. E. quarter Sec. 16, T. 3 S., R. 6 W.  
 Doetker, S. E. quarter Sec. 21, T. 3 S., R. 6 W.  
 Taylor, S. W. quarter Sec. 21, T. 3 S., R. 6 W.  
 Case, N. E. quarter Sec. 20, T. 3 S., R. 6 W.  
 Blake, S. W. quarter Sec. 1, T. 3 S., R. 7 W.  
 Beazlee, N. W. quarter Sec. 11, T. 3 S., R. 7 W.  
 Henke, S. E. quarter Sec. 10, T. 3 S., R. 7 W.  
 Baumeister, N. W. quarter Sec. 11, T. 3 S., R. 7 W.  
 Brust, N. W. quarter Sec. 12, T. 3 S., R. 7 W.  
 McKeen, S. E. quarter Sec. 12, T. 3 S., R. 7 W.  
 Gille, N. W. quarter Sec. 13, T. 3 S., R. 7 W.  
 Powers, S. W. quarter, Sec. 14, T. 3 S., R. 7 W.

These coals vary from semi-block to caking, and range from one and a half to five and a half feet in thickness with an average of two and a half feet. More or less sulphur is generally present.

Going west from Stendal, we find the western front of the conglomerate wall fretted with small spurs which project still farther into the coal basin. These spurs and intermediate valleys existed before the era of coal K. We find this seam deposited thinly on the crests and side of the hills, but thickening as it descends to the dividing valleys, and especially as it rapidly dips westward to the basin of South Patoka, on the head of which it develops an average thickness of four feet two inches. Considerable quantities have been dug. The product is a bright caking coal. The pyrite is banded and may be easily removed in mining.

The following exhibit of outcrops on the Powers and Tevault farms, sections 16 and 17, township 3 south, range 7 west, shows the accompanying strata, viz.:

POWERS-TEVAULT SECTION.

Magnesian limestone.....	6 ft. 0 in.
Aluminous shale.....	1 ft. 0 in.
Black sheety slate.....	2 ft. 6 in.
Coal K.. ..	4 ft. 2 in.
Silicious shale.....	5 ft. 4 in.
Argillaceous sand rock, to Buck creek..	10 ft. 0 in.
	<hr/>
	33 ft. 3 in.

The limestone above appears to be highly magnesian, and contains the following fossils, viz.: *Productus punctatus*, *P. semireticulatus*, *Chonetes mesoloba*, *C. ———*, *Eumicrotis Hawni* (?), *Nautilus decoratus*, and *Allorisma*.

I visited several openings at the Warrick county line, in sections 28 and 29, township 3 south, range 7 west, worked by Miller, Skegs and Gentry, where the following was taken:

SECTION AT MILLER'S BANK.

Slope.....	20 ft. 0 in.
Thin bedded sandstone.....	8 ft. 0 in.
Quarry sandrock.....	10 ft. 0 in.

Silicious shale.....	9 ft. 0 in.
Potters' clay with iron stones.....	1 ft. 0 in.
Ferruginous limestone, with <i>Spirifer</i> <i>cameratus</i> , <i>S. lineatus</i> , <i>Productus</i> <i>punctatus</i> , <i>P. costatus</i> , <i>Chonetes</i> , and an Articulate (sp.?).....	1 ft. 8 in.
Ferruginous paints.....	0 ft. 7 in.
Gray clay shale.....	2 ft. 2 in.
Ochreous clay.....	0 ft. 6 in.
Black bituminous sheety slate.....	2 ft. 5 in.
Coal K :	
Slaty coal.....	0 ft. 4 in.
Fair coal.....	1 ft. 0 in.
Pyritous coal .....	1 ft. 2 in.
Good coal.....	2 ft. 0 in.
	————— 4 ft. 6 in.
Fire clay to creek.....	4 ft. 0 in.
	————— 66 ft. 10 in.

At Pleasantville I was much indebted to Rev. John Ferguson for hospitality, information and guidance. This enabled me to visit many outcrops, which otherwise my limited time would have compelled me to pass unnoticed.

## COALS EAST OF PLEASANTVILLE.

	THICKNESS.	
	Ft.	In.
Farmer, S. W. qr. Sec. 6, T. 3 S., R. 7 W.....K	.....	.....
McClary, S. E. qr. Sec. 7, T. 3 S., R. 7 W.....K	4	2
McClary, S. W. qr. Sec. 8, T. 3 S., R. 7 W.....K	4	0
Roy, N. W. qr. Sec. 18, T. 3 S., R. 7 W.....K	4	0
Lance, N. W. qr. Sec. 18, T. 3 S., R. 7 W.....K	4	0?
Fleming, N. E. qr. Sec. 18, T. 3 S., R. 7 W.....K	4	0?
Powers, S. E. qr. Sec. 17, T. 3 S., R. 7 W.....K	4	4
Tevault, S. W. qr. Sec. 16, T. 3 S., R. 7 W.....K	4	2
Sprinkle, N. W. qr. Sec. 21, T. 3 S., R. 7 W.....K	4	1
Miller, S. E. qr. Sec. 21, T. 3 S., R. 7 W.....K	3	6
Ferguson, (well) S. W. qr. Sec. 21, T. 3 S. R. 7 W..K	4	0?
DePriest, (well) S. E. qr. Sec. 20, T. 3 S., R. 7 W..K	4	0?

	THICKNESS	
	Ft.	In.
McKinney, N. E. qr. Sec. 19, T. 3 S., R. 7 W.....K .....		
Miller, N. E. qr. Sec. 29, T. 3 S., R. 7 W.....K	4	6
Skeggs, N. W. qr. Sec. 29, T. 3 S., R. 7 W.....K	4	2
Hamilton, N. W. qr. Sec. 1, T. 3 S., R. 8 W.....K	5	0?
Hamilton, N. W. qr. Sec. 1, T. 3 S., R. 8 W.....K	5	6?

Northeast from Pleasantville, the yellow limestone roof of K is in thin bedded strata, and is quarried and used for walling wells, etc. Partings between the laminæ are covered with *Chonetes*. Immediately at the village, seam K with a dark limestone roof, passes below the surface. A short distance west, seam L is seen. At Tyring's bank, northeast quarter section 23, its usual roof material is removed and replaced with coarse sand rock as will be seen by the following exhibit, viz.:

#### SECTION AT TYRING'S BANK.

Soil and modified drift.....	15 ft. 0 in.
Loose soft sandstone.....	8 ft. 0 in.
Quarry sandstone, coarse, ferruginous.	7 ft. 0 in.
Coal L.....	2 ft. 4 in. to 3 ft. 0 in.
Fire clay.....	3 ft. 0 in.
Covered.....	27 ft. 0 in.
Limestone roof of K.....	2 ft. 0 in.
Covered.....	5 ft. 0 in.
Black sheety slate of K in creek.....	.....
	<hr/> 70 ft. 0 in.

The product of this bank is a rich caking coal, which burns with a clear flame, leaves a white ash without a clinker, and is much sought after by blacksmiths.

Good clay iron stones, suitable for the manufacture of ochreous paints, were noticed in considerable quantities in southeast quarter southeast quarter section 22, and near center of section 21, township 3 south, range 8 west. Further exploration alone would determine whether the quantity would be sufficient to command the attention of



iron makers. The surrounding slopes are deeply covered. No rocky outcrops were seen. It is believed that this band of paint stones represents the place of coal M, which is reported in wells at this horizon.

To the south and to the west, a line of conical hills and narrow ridges, capped with massive argillaceous limestone, separates the basin of erosion in which is collected the water of South Patoka from the basins of the Wabash and Ohio rivers. From the summit of one of these, which is marked on the map McGregor hill, section 9, township 3 south, range 8 west, a beautiful view is spread out. The cup-shaped valley of the South Patoka lies 175 feet below. To the southeast of Snake knob, seven miles distant, is seen Detney Hill, twelve miles southsouthwest. Stendal, eleven miles due east. To the northeast the alluvial plain, gently terraced with modified drift, is backed by the hills near Winslow. It is a scene at once interesting and attractive—a mighty record of the past, of noble currents and cycling ages. A witness that time is long.

The following section combines measurements taken at McGregor hill above mentioned with those of Snake knob, section 34, township 3 south, range 8 west, on Captain Fowler's farm, in Warrick County, the latter in the second column. The two sections are here brought together for the purpose of showing the equivalence of strata at stations separated by a space of more than three miles :

SECTION AT M'GREGOR HILL AND SNAKE KNOB.

	Ft.	In.	Ft.	In.
Soil and clay.....	5	0	15	0
Limestone, argillaceous, clinky.....	6	0	3	6
Space covered, place of upper <i>rash</i> coal.....	6	0	15	0
Limestone, compact, clinky.....	3	0	4	0
Clay shale and nodules.....	4	0	2	0
Place of lower <i>rash</i> coal.....	?		?	
Fire clay, buff.....	2	4	2	6
Sandstone, coarse, red.....	8	0	15	0
Silicious shale with carbonaceous partings.....	16	6	8	0

Argillaceous shale with pyritous partings.....	8	0	12	0
"Black clod," rotten slate.....	2	0	1	3
Coal <i>N</i> , choice white ash gas coal.....	1	0	1	1
Fire clay.....	3	0	3	2
Silicious shale and thin bedded sandstone.....	20	0	18	0
Calcareous and clay iron stones, place of coal <i>M</i> . ?				?
Clay shale mostly covered to the level of coal				
<i>L</i> at nearest point measured by barometer...	72	0	70	0
	<hr/>			
	156	10	170	6

The argillaceous lime rock in the above section is sometimes widened up to a thickness of eight or ten feet. Compact and not easily eroded, it proved, along this its apparent eastern limit, a bulwark against which the ancient currents could not always prevail. And hence the conical hills so capped. Crevices are found between, and cavities beneath; the immense blocks undermined and thrown out of place. These cavities, at the time of the first settlement of this region, were the winter resort of the snakes that occupied an area of from three to nine miles around. Here the venomous tribes, with consorting sub-families and friends, would collect in autumn, remain torpid through the winter, and then, wakened by the sunny smiles of spring, go forth to their old summer homes.

Snake knob was a famous resort. Peter Ferguson, an early pioneer, noticed serpents in the fall gathering here from all parts within a compass of several miles. He collected a squad of neighbors, and dug them out in winter, when torpid, killing over one hundred, mostly rattlesnakes, but including a few chicken-snakes. The animals in their torpid condition could not offer resistance, and were only revived by the brilliant sunlight enough to writhe a little when cast out into the snow. After this campaign at Snake knob, a similar massacre at McGregor hill and another at a station a few miles east, allowing a range of nine to twelve square miles for each community, the rattlesnake family was nearly exterminated. They are now rare. Mr. P.

Ferguson, during his lifetime, killed a rattlesnake having twenty-nine rattles and a button, indicating an age of thirty years. Others have seen and known of their capture when armored with rattle-rings numbering fifteen, twenty, twenty-one to twenty-five. After passing beyond an age of twelve years these rings are always much worn on the under side, especially in stony or sandy regions. A monster of this species was killed near Pleasantville in 1871, and brought to the village for exhibition. It weighed fifty pounds on the warehouse scales.

In addition to the openings at Tying's bank, coal L was formerly worked on M. Parker's land, northeast quarter southwest quarter section 14, township 3 south, range 8 west, and on the Mosier farm, section 4, same township and range. The reported thickness at each of these banks was three and a half to four feet. At Bell's, section 17, the seam was less than two feet thick.

Near Arcadia, coal K has been worked for smiths' use at Lemaster's bank, and is four feet thick. At other farms in this vicinity it has been dug to in wells, and evidently underlies a considerable area.

#### COALS NEAR ARCADIA.

Lemaster, S. W. quarter Sec. 25, T. 2 S., R. 8 W.

Ashby, S. E. quarter Sec. 25, T. 2 S., R. 8 W.

Gentry, S. W. quarter Sec. 35, T. 2 S., R. 8 W.

Sandusky, S. E. quarter Sec. 26, T. 2 S., R. 8 W.

Werth, S. E. quarter Sec. 22, T. 2 S., R. 8 W.

Continuing northwardly, K descends and passes below the bed of the streams, and coal L is discovered above the water level. On the line of the Louisville and St. Louis railway this seam probably becomes persistent, and at G. W. Massey's bank, northeast quarter section 4, township 2 south, range 8 west, where the Evansville Straight Line Railroad crosses Patoka river, Dr. D. D. Owen reported the thickness at over ten feet, and said that it was one of the thickest coals that he had seen in the State. At Thomas

Martin's bank, coal L is not less generously thickened up. The product is a rich caking coal, which burns with a slightly-tinted flame, leaving a white ash, but no clinker.

**SECTION AT MARTIN'S BANK, NORTH HALF SECTION 9,  
TOWNSHIP 2 SOUTH, RANGE 8 WEST.**

Soil, clay etc.....	18 ft. 0 in.
Black slate.....	1 ft. 0 in.
Soft slate (rotten coal?) .....	1 ft 6 in.
Coal M.....	1 ft 1 in.
	————— 2 ft. 7 in.
Fire clay.....	4 ft. 6 in.
Silicious shales and soapstone covered (measured by barometer).....	57 ft. 7 in.
Soapstone with ferns.....	4 to 1 ft. 0 in.
Coal L :	
Slaty coal.....	0 ft. 4 in.
Laminated coal.....	2 ft. 6 in.
Soft black slate.....	0 ft. 4 in.
Good smith coal.....	1 ft. 6 in.
White clay and soft coal	0 ft. 2 in.
Good smith coal.....	2 ft. 6 in.
Rash pyritous coal (not seen) .....	2 ft. 0 in.
	————— 9 ft. 2 in.
Fire clay.....	4 ft. 9 in.
	————— 98 ft. 0 in.

The floor of the entry at Martin's bank was covered with water at the time of my visit. A complete measurement could not be effected. The seam at this and Massey's bank may be worked up to a thickness of six or seven feet of fair to choice coal, after making allowance for impurities. It is probable that on more extensive work it will be found that these coals dip rapidly to the northwest at a rate of not less than twenty to forty feet to the mile.

West of the county line Andrew Hargrave has erected a

lime kiln and burns the "gray limestone" mentioned by Dr. D. D. Owen in his report.\* This rock is probably equivalent to the deposit of a similar nature on top of Snake knob and McGregor hill. Formerly its eastern limit was miles beyond this locality, as blocks of limestone, rounded, grooved and singularly cut by water, are found on the farms of G. W. Massey and Horace Williams, two miles distant.

## ECONOMICAL GEOLOGY.

### COAL.

The coals of this county are generally caking. In quantity they are fully up to the average of similar coals in the Western States. An examination of the foregoing section and details shows from frequency of out crop, that they are of great persistence. They are the thickest beds of such grand extent that I have seen, and would seriously try the carrying capacity of *all* the railways that have ever been projected in the county. The present demand is limited to local supply. No shafts have been sunk. Openings have only been made on natural outcrops. These are enough to show, that, with facilities for transportation at hand the coals of Pike county could pay off our great national debt, and still leave a handsome profit to the owners.

### CLAYS.

The loess sands and yellow clays furnish good material for bricks. The fire clays underlying the coals are almost as valuable as the fuel resting upon them. The future demands fire proof buildings. From these clays will be made window and door casings, cornice and ornamental coping, at once durable, handsome and incombustible. Good potters' clay may be obtained by weathering this deposit, or from the glacial and lacustrine clays in the northern part of the county.

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\*D. D. Owen, Geological Recon., Ind.

## IRON.

Silicious ores are found amongst the conglomerate sandstones, north and east of Pikesville. They are not desirable. The ferruginous limestone quarried from the bed of the canal south, and along the banks of White river north of Petersburg, will furnish a flux rich in iron to mix with the specular ores of Missouri. The clay iron stones in the southern part of the county will make good paints; and when abundant, as in the southwestern corner, they will merit the attention of iron makers.

## OTHER METALS.

Small quantities of gold and copper are found in the modified drift and clays of the glacial age. The particles are minute and of no importance. Occasional specimens of lead ore are found; but oftener "plants" are made by swindlers who guide innocent parties to the deposit and deceive the unwary. The red men had no knowledge of metallurgy, even the simplest: yet fifty places are pointed out by Indian story, as "lead and silver mines." Prof. Orton naively remarks on this subject; "If the red man owes any malice to the race that has dispossessed him of his hunting grounds, he may take a grim satisfaction in contemplating the arduous and unrequited toil to which his idle tales have doomed the laziest of his oppressors." No evidence was seen that indicated natural deposits of either lead or silver ore in this county, and we may add, that their existence is highly improbable if not impossible. Small crystals of sulphuret of zinc were sometimes seen in the iron stone nodules and septaria.

## BUILDING STONE.

The massive member of the subcarboniferous sandstone so well developed for miles in every direction about Pikesville, furnishes the best of material for masonry. Natural out crops exhibit a wonderful capacity for withstanding the disintegrating influences of air and moisture. Characteristically, it

is known as a fire stone, and may be used for hearths of furnaces and rolling mill ovens. Good coal-measure sand rock is found near Highbanks, at Hawthorn and Centreville. The limestone roof of coal K, has been used for foundations. It is generally argillaceous, and when so, will not bear exposure.

## SOIL.

The soil of the northern half of the county consists of dark colored alluvium, sandy loams, and loess. It is generally productive. Good crops of wheat, oats, corn and grass are raised. White river bottoms, are remarkable for luxuriant crops of corn. Patoka bottoms consisting of impalpable sands, etc., washed from the loess hills, are impervious to air and moisture. Parched by drouth, or overwhelmed by rain falls, they require underdraining, which will remedy both these difficulties; when so improved, the "coming farmer" will undoubtedly irrigate these broad flats from the river which flows a few feet below.

In the basin south of Patoka, the earth is highly charged with mineral salts, and has the peculiar red hue of soils which contain the decomposed iron stones of the mountain limestone. Here tobacco grows well. I am informed by experts that the "leaf" will compare favorably with the best Kentucky or Missouri product. Tobacco land, exceeding the Connecticut valley in productiveness, may be bought at less than thirty dollars per acre.

The areas throughout the county from one to two hundred feet above the water courses, are elevated beyond the level of sudden changes in temperature. They are exempt from biting frosts, and are specially adapted to the growth of fruit. Peaches and pears are nearly as reliable as corn or wheat. The fruit is large, beautifully colored, and highly fragrant.

## SPRINGS AND WELLS.

North of Patoka river, the water derived from this source is fair to good. South of that stream, and in the conglom-

erate region about Pikesville, the waters are highly charged with mineral salts, unpleasant to the taste, and, in times of drouth, cause inflammatory diseases. Persons having a due regard to comfort and health, construct cisterns. The rain fall furnishes an abundant supply of pure water. Pools are easily made in small basins or ravines, to insure comfort and health to farm animals.

#### MEDICINAL SPRINGS.

The "White Sulphur Spring," Captain Townsend proprietor, has all the good qualities belonging to springs of this kind. The water is not so highly saline as those of Orange county, but is equally efficacious in chronic diseases of the liver and digestive organs. The Ague Chalybeates, near Pikesville are locally well known.

Millburn spring, near Winslow, according to a proximate analysis by Dr. DeTar, contains, in addition to the sulphates of magnesia, alumina, lime and iron, a small amount of arsenite of iron and a trace of bromine. These and other unknown ingredients have effected many cures. Certificates are published representing this water as nearly a specific in gravel and diseases of the spleen.

The acidulous water of Coats' spring, near Centerville is locally well esteemed. It is believed to act on the secretions generally, and was highly recommended by a corpulent gentleman on the spot, to his brother "fat-men."

#### TIMBER.

The finest growth of White Oak and Poplar timber that I have ever seen, is found in a belt lying one to three miles north of the Patoka. Trees five feet in diameter, with perfect trunks fifty or more feet in length, were common, while monsters of much larger growth are not unusual. A giant Hickory, northwest of Centerville, on section 8, township 1 south, range 9 west, was measured with the assistance of Rev. L. Wilson, and found to be over five feet in diameter three feet above the ground. The trunk was of great uniformity,



maintaining that size to a height of sixty feet without limbs; and for size challenges its kind throughout the world. Choice uncultured White Oaks are abundant in the southeast corner of the county.

#### ANTIQUITIES.

An oblong mound south of Petersburg, whether natural or artificial, contains implements and bones of our predecessors. A few regular mounds are seen near Pleasantville and Otwell. The high sand-bars capping the bluffs of White river, have been used as places of ancient sepulture. Axes made from dark granite of the boulder drift, ornaments of northern variegated soapstone, and large spear-heads made of flint, are probably relics of the Mound-Builder.

Thanks are due to the following gentlemen, and many others, for information, assistance, and guidance, viz.: Messrs. Posey, Mr. Shandy, G. Morgan, Rev. Martin, Dr. Thornton, R. P. Hawthorn, and Editors Posey and Leslie, at Petersburg; Rev. L. Wilson, at Centerville; Dr. Daniels, James Case, T. Case, S. Trailer, Captain Townsend, at Otwell; Dr. De Tar, at Pikesville; Z. Whitman, C. De Bruler, and others, at Winslow; Rev. W. Baumeister, at Stendal; Rev. Ferguson and Captain Fowler, at Pleasantville, and G. W. Massey, County Commissioner.

Acknowledgements are made to the officers of the Evansville and Crawfordsville, and to the Terre Haute and Indianapolis Railroads, for courteous assistance.



EUGENE, INDIANA, October 22, 1872.

PROFESSOR E. T. COX,  
*State Geologist:*

SIR:—In accordance with your request, I have made a hurried reconnoissance of the counties of Jasper, White, Carroll, Wabash, Miami, and Howard—giving, on an average, something less than two days to each—and submit the following report. It is not presumed that it will exhibit such precision in its outlines as a more thorough survey will obtain; and which would tend to develop the resources of that portion of our State.

JOHN COLLETT.



**GEOLOGICAL RECONNOISSANCE**  
**OF**  
**Jasper, White, Carroll, Cass, Miami, Wabash**  
**AND**  
**Howard Counties.**

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**BY PROF. JOHN COLLETT,**  
**ASSISTANT STATE GEOLOGIST.**

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**GENERAL FEATURES.**

Excepting Jasper, the counties named are situated in the hydrographic basin of the Wabash river, being generally in its present or ancient valley, which in extent, from east to west, is more than half the entire width of the State. Jasper county lies in the valley of the Iroquois and Kankakee rivers.

As the Wabash valley is approached from Indianapolis by way of the Lafayette and Indianapolis Railroad, the descent from the ridge dividing the Wabash and White river valleys is quite rapid.

The Wabash valley is a broad plane, marked by a deep, black, peaty soil, and is so nearly level as to require in many places artificial drainage. When this is done it becomes highly fertile.

The table land, which is about three hundred feet above White river at Indianapolis and nearly four hundred feet above the Wabash at Lafayette, is evidently the undisturbed floor of the boulder drift. Below the peaty surface is found the clays and polished, rounded and striated stems of that epoch. Massive granitic and metamorphic boulders are found deeply buried in these, but no boulders are seen on the surface.

These features are conspicuous along the road near Whitestown and from the water-tank at Lebanon, to, and a short distance beyond Hazelrig. From this point the surface is gently undulating with an occasional boulder protruding through the surface on the knobs and prairies, as rapidly descending toward the Wabash river, hills and valleys are noticed, boulders are more frequently seen; occasional beds of gravel occur until near Lafayette, where will be found relics of the boulder drift, with heavy beds of ancient river alluvium; and high up on the terraced bluffs are marked indications of the different levels of the river during past ages.

To the north and northwest of Lafayette, we find the reverse of these conditions. First, alluvial bottom; second, terraces and terraced prairies of sandy alluvial loam underlaid with gravel; third, a gently undulating level with many boulders on or near the surface; and lastly, a level plateau nearly four hundred feet above the level of the Wabash river at Lafayette, on which boulders are not seen, and which is the floor of the glacial drift.

From these facts, I infer that the Wabash and its tributaries have, in the past, traversed all the region between the summit levels, embracing a belt from ten to fifteen miles in width, on either side of its present channel; and they have eroded the great valley through which the river flows, to a depth varying from 0 to 400 feet, with an average width of twenty miles, and that the system of hills and valleys that border this river are not the effect of direct creative agency but were produced by the erosive force of waters. It was by the same force also that the gigantic boulders which,

deeply imbedded in the plastic clays that mark the close of the drift epoch, were uncovered and exposed to view.

The ridge forming the limit of the valley of the Wabash on the north is not so well defined as that on the south. It commences on the west line in Benton county and passes thence in a northeasterly direction across portions of Benton, Jasper and White counties, and thence east to counties not yet examined, and is in places cut through by the Tippecanoe river and other streams.

Generally this ridge forms the dividing line between the basins of the Wabash and Kankakee rivers, and its northern slope is belted with low sand terraces and beds of sand that mark the outline of what once was "Old Lake Kankakee," as named by Prof. F. H. Bradley in the Illinois Geological Reports, volume IV.

Profiles of the Louisville and Chicago Railway show that it would not require a very deep cut canal to bring the waters of the Kankakee into the Tippecanoe river, and thus drain that vast region of swamps and slashes, and at the same time, by the increased volume of water, protracted in its flow by the difference of altitude, add much to the navigability of the Wabash river.

## JASPER COUNTY.

The southwestern half of this county is a gently rolling prairie of black loamy soil. In the northern and northeastern portion, the soil is sandy with oak openings and slashy prairies interspersed with sandy knolls and ridges, and is in a wild state of nature scarcely disturbed by the hand of man.

The whole county is underlaid by beds of bowlder drift, which varies in depth from twenty feet, in the valley of the Iriquois river, to nearly two hundred feet at some of the higher ridges.

The rocky exposures of this county are wholly of the Devonian and Silurian ages. Considerable fragments of black slate and small bits of coal are met with in digging

wells in the boulder clays, which indicate that the sub-carboniferous sandstone and possibly the outline of the carboniferous age, at one time, extended beyond this county to the north, but were eroded during the great ice flow from the northwest.

The following section, made from the observation of isolated localities, will serve to give a general idea of the rocks of this county :

#### CONNECTED SECTION.

Soil and loam.....	2 to 5.00 ft.
Boulder drift.....	20 to 200.00 ft.
"Waverly" or knob sandstone.....	15.00 ft.
Louisville-Delphi black slate.....	62.00 ft.
Coarse, white sand rock (local).....	0 to 15.00 ft.
Devonian limestone.....	5 to 2.00 ft.
Silurian limestone (exposed).....	8.00 ft.
Silurian limestone, porous with cavities filled with petroleum and gas (in bore).....	855.00 ft.
Total.....	1162.00 ft.

The highest rocks in the geological series occur near the southern boundary of the county, a short distance north of Remington. They are an argillaceous sandstone, having an exposure of about twelve feet in Jordan's Grove, on Carpenter's creek. Stratigraphically, it is the lower division of the Waverly or Kent sandstone; sometimes considered a member of the Devonian. It is better known as the sub-conglomerate sandstone.

In former years, this stone was quarried for local use for foundations, but is not now in work.

At the only exposure, it was irregularly bedded, and from the only fragments visible would not compare favorably with other stone found in the county.

A short distance further north, on Carpenter's creek, the Louisville-Delphi black slate is seen in the bluff underlying the above mentioned sandstone. The exposure measures



twenty-three feet, is slightly glazed with bituminous matter, and the odor of petroleum is perceptible. During the oil excitement a bore was here put down, and the slate was found to extend forty feet below the surface, making the total thickness sixty-three feet. It is probable that the erosive force of the boulder drift had thinned this bed not less than thirty feet.

About four miles west, at Allen quarry, on a branch of Carpenter's creek, a thin bed of limestone is extensively worked for building purposes. Several dwelling houses and barns of this material give a pleasing variety to the architecture of the vicinity. The stone seems to weather well. No fossils were found by which to determine its horizon.

At Rensselaer, the county seat, the Iroquois river flows over a bed of limestone. A few corals and a fragmentary specimen of *Pentramites galeatus* show that it belongs to the upper silurian age. This limestone is here cherty, and neither fit for burning into lime nor for building purposes. A short distance below the town it is purer, and has been burned to lime to supply the local market. A short distance above town, near the old mill dam, thin beds of limestone of the Devonian age are seen in the low banks of the river. A few broken fossils were seen, among which were *Cyathophylloid corals*, *Atrypa aspera*, *A. reticularis*, and *Spirifer euritines*.

This bed is the only rocky exposure seen on the Iroquois river in Jasper county. It is an original ridge of deposit, having a line of strike from N. N. E. to S. S. E., and from surface indications veering to the northeast a few miles north from Rensselaer. A new exposure in the western part of the town still records the mighty effects of the great ice flow which resulted in the boulder drift.

The surface is rutted and polished, while the scratches show that the direction of the current was a little west of south. Three miles southeast of the town is the Phillips' sand rock quarry, owned by J. C. Van Rensselaer. It is a coarse grit, containing a few pebbles, and is very similar to the conglomerate sand rock. It has been used for build-

ing and other purposes at Rensselaer with good results. Being in a considerable degree fire, as well as weather proof, it is an important part of the mineral wealth of the county.

Water-worn casts of a few plants of the carboniferous age were noticed in the stone.

The Logansport and Peoria Railroad passes from east to west along the southern part of the county, and the Continental Railway Company has graded the bed of its road from Rensselaer to a connection with the Louisville and Chicago Railroad, on which they intend to lay steel rails as early as the season will permit. The latter road is intended to be a great through line from New York to Omaha, with a branch road from Rensselaer to Chicago, and is thought by those most interested, will prove to be a road of great advantage to the commercial interests of the county.

A reliable bed of gravel, of about twenty-five acres in area, was noticed on the farm of Mr. Thompson, on section 16, township 29, range 6, a few miles north of the town, and another bed of about two acres was seen on the opposite side of the creek. These, together with the abundant limestones about the county seat, afford ample facilities for the construction of gravel roads.

Bog ores of iron are abundant in the northern part of the county. The area of deposit, after careful examination by Mr. S. P. Thompson, being estimated as follows:

Township 30 north, range 7.....	700 acres.
Township 30 north, range 6.....	500 acres.
Township 30 north, range 5.....	500 acres.
Township 31 north, range 6.....	1500 acres.
Township 31 north, range 7.....	500 acres.
Township 32 north, range 5.....	1000 acres.
Township 32 north, range 6.....	500 acres.
Township 32 north, range 7.....	500 acres.

Many other beds of smaller area are known to exist.

These ores are collected in a soluble state by the waters of sloughs and ponds, in the center or lower part of which they are found in comparatively pure layers, deposited as

the waters are evaporated in dry seasons. The beds are generally from one to two and a half feet below the surface of the ground, and from five to six inches thick (with a reported thickness, in some places, of two and two and a half feet.)

In 1870 Mr. L. Glazebrook dug and shipped from San Pierre station, on the Louisville, New Albany and Chicago Railroad, 500 tons of ore, part being from Jasper county and part from Starke county. Other parties dug and shipped from the same point from 300 to 800 tons. The price obtained was \$3 per ton delivered aboard the cars, which paid well for digging, and less than three miles hauling to the railroad.

The ore was taken to the Planet Furnace, in Clay county, but, on account of the high rates of freight (three dollars per ton, as I am informed,) imposed by the railroad, the business was abandoned.

The ore is pure, and makes, by admixture with the rich ores of Lake Superior, a very desirable quality of metal; and with reasonable freights, large quantities of the ore would be in demand.

The divide which separates the Kankakee and Iroquois rivers, is a succession of low ridges of pure yellow or white sand, interspersed with swampy valleys from one hundred to four hundred yards in width, indicating ancient river channels.

The soil in these valleys is peaty and of no very great depth, and is underlaid by a deposit of white sand. The timber consists of White Oak, Hickory, and, on fair soil, Burr Oak.

The numerous river beds above mentioned show the extent of the region traversed by the Kankakee and Iroquois rivers before finding a fixed channel, when "old Lake Kankakee" was first drained off.

#### ECONOMICAL GEOLOGY.

It will be seen from the introductory remarks that Jasper county contains a large body of highly productive lands.

The principal products are corn, oats, hay, grass, and wheat. Herds of cattle and hogs are pastured and fed for market. In the northern part of the county there are large bodies of wild land; oak openings, sand ridges, and low meadows alternating. This soil is not of the best; but, subdued and improved by German and Swedish emigrants, it yields this hardy and frugal people satisfactory returns. These lands may be bought in quantity at from \$3 to \$5 per acre.

*Timber:* A narrow strip of deep, rich, alluvial soil, from one to two miles in width, along the southern margin of the Kankakee, is well timbered and highly productive. Groves and skirts of timber are found along the water courses, which have been found sufficient to supply the demand for all purposes. Much attention is given to growing hedges, and soon the large farms will be inclosed by live fences of Osage Orange, which I am informed succeed well.

*Minerals:* The area of the Bog ores of iron is large and the quality good. Means of transportation is all that is required to develop a large income from this now profitless treasure.

The sand rock near the county seat is of excellent quality; equal to any in the State for foundations of buildings and other heavy masonry. The whole county is underlaid with limestone of the upper silurian age, known to be several hundred feet thick, and it is believed that future demand will justify shafting for this valuable stone for building purposes. The surface outcrops furnish abundance of stone to be burned into lime.

*Mineral Springs:* A number of mineral springs near Rensselaer were visited, the waters of which experience has determined to be highly medicinal. Among them are some white sulphur springs, which, in a malarious climate, are worthy of attention. Half a mile east of the county seat, a well that was bored to the depth of 800 feet discharges a large volume of sulphuretted water. This well is supplied from a crevice about one hundred and eighty feet below the surface. Another well in the court house yard, that was

bored with a "diamond drill," furnishes a supply of water near the surface. The "core" brought up by the drill furnishes an interesting view of the rock below.

*Petroleum*: It has long been known that Jasper county affords abundant evidences of the presence of Petroleum. In the geological map of Indiana, published by Dr. Brown, former State Geologist, this county was included in a small area marked "the oil region." At low water, oil oozes from crevices and partings in the limestone rocks at Rensselaer; and from a well sunk to the depth of fifteen feet in this rock, several gallons of oil were obtained, and large lumps of bitumen (desiccated petroleum) were found in the excavation made for the railroad track a few miles east of town, some of which were hardened into asphaltum. These evidences of its presence induced search for the precious fluid, and several bores were put down. The bores at the county seat determined the existence of a bed of porous lime rock from eighteen to thirty feet thick, just below the thin bedded limestone which underlies the black slate. None of these wells yielded any appreciable quantity of oil, and it is not probable that a paying well will be obtained, as the fluid is so diffused in the small pores of the rock as to render its collection very difficult, which is also the case at Chicago, where bores were made in a similar rock.

Small quantities of inflammable gas escapes from each of these bores, and also from many natural fissures. A well put down to a depth of one hundred feet at Francisville, discharges a large volume of gas, which inflamed, serves to light up an area of many acres, and may be utilized for household, culinary and illuminating purposes.

*Antiquities*: Not many evidences by which to determine the character of its former inhabitants were seen. Spear and arrow heads of an unusual form and of a glossy chert, seen only in Tennessee, are here found; also, highly polished stone axes and scrapers.

A mound, on the east side of the Iroquois river, about four miles northeast of the county seat, is the only relic of the

Mound-Builders that was seen ; it was nearly ten feet high, forty feet in diameter and contained ashes, bones and shells.

### WHITE COUNTY.

This county adjoins Jasper on the east ; and is, generally of a similar nature. The southern and western portions are mostly prairies where the surface has been modified by action with a fertile and productive soil. Good crops of corn, wheat and meadow grass are raised ; blue grass is indigenous and with some care furnishes the richest permanent pastures. The northern part of the county is more sandy, and large herds of cattle are annually pastured during the summer months.

East of the Tippecanoe river the land is more rolling and a large quantity of choice oak timber stands ready to be converted to various uses for future improvements.

The Tippecanoe river flows in a southerly direction, and its tributaries, the two Metanonongs, flow in an easterly direction through the county. All the streams are full of fishes and are the favorite haunts of the disciples of Izaak Walton.

The rocky formations consist of shales and limestones of the Devonian age, overlying the upper silurian lime rock.

#### CONNECTED SECTION, WHITE COUNTY.

Soil and fluvial drift.....	5 to	60 ft.
Boulder drift.....	10 to	150 ft.
Black slate.....		81 ft.
Thin bedded limestone.....	10 to	2 ft.
Silicious limestone.....	2 to	12 ft.
		<hr/> 305 ft.

The Tippecanoe river is one of the most important features in this county, not only as a means of wealth but as well in a geological point of view. To agencies connected with it are due effects which have largely moulded the surface configuration. Immediately after the close of the lake

period when the waters of old Lake Kankakee and Lake Iroquois had been partially drained away, this vein commenced extending along the valley to the north by erosion. This mode of action necessarily contemplates an erratic channel. We consequently find large beds of fluviatile drift along its banks, and at Monticello trunks of cedar and other woods have been met, in digging wells, down to a depth of forty feet.

The following section of a bed of fluviatile drift, opposite Norway, gives a general exhibit, with features at intervals indicating a probability, at least, of lacustrine phenomena :

SECTION OPPOSITE NORWAY.

Yellow sand.....	6 ft.
Gray sand, lacustrine.....	22 ft.
Blue clay, slightly laminated.....	4 ft.
Coarse gravel.....	16 ft.
Compact clay, laminated.....	5 ft.
Gravel, coarse.....	18 ft.
Hard sandy clay.....	4 ft.
Clayey gravel.....	10 ft.
Black slate.....	10 ft.
Coarse silicious limestone, with Devonian fossils and odor of petroleum.....	2 ft.
	<hr/> 97 ft.

The foregoing is thrown up against and backed by the black slate, and affords a clue to the history of the long past worthy of a careful study.

Just above the Norway mill-dam is a bold exposure of the black slate, which affords the following section :

SECTION AT NORWAY DAM.

Fluviatile drift, covering upper divi- sion of black slate.....	30 ft. 0 in.
Black slate.....	40 ft. 0 in.
Black slate, odor of petroleum.....	18 ft. 0 in.

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Clay.....	0 ft. 6 in.
Black slate with mineral tar.....	5 ft. 0 in.
White clay.....	0 ft. 6 in.
Black aluminous slate.....	5 ft. 0 in.
Concretionary band.....	2 ft. 0 in.
Blue shale.....	5 ft. 0 in.
Gray argillaceous shale.....	4 ft. 0 in.
Devonian limestone, containing <i>Zaphrentis gigas</i> , <i>Z. Rafinesquii</i> , <i>Pentamerus athyris</i> , to bed of river.....	2 ft. 0 in.
	<hr/>
	112 ft. 0 in.

At the upper part of this outcrop, in a ravine, a shaft was put down through the lower division of the black slate in pursuit of coal. No coal was found.

At Lowe's quarry, near the mouth of the Monon, stone is quarried for local use, from a thin bedded deposit of Devonian lime rock, containing *Pentamerus* and *Crinoid* stems. The rock is cherty, and not of satisfactory quality; some highly silicious layers, composed in part of silicate of lime, is a good fine stone.

Ball's quarry, one mile west, is of similar stone, and has been used for similar purposes. Still farther up the Monon, and four miles east of Bradford, Mr. Larkin Lowe quarries, from the bed of the river, stone which is burned for local use. It produces a fair article of lime. Owing to a rapid rise of strata going west from the valley of the Tippecanoe, a lower strata and belt of lime is exposed. *Pentamerus* and legathephyllleice corals indicate the upper beds of silurian age. A short distance to the west, heavy beds of the same rocks are seen along the river banks, with pits and cavities filled with petroleum and bitumen.

On the bank of the same stream, at Bradford, is an outcrop of a limestone very similar to that burned so successfully at Delphi, having a thickness of about twelve feet. Although not so pure as the deposit at Delphi, a fair article of lime is produced. It contains *Pentamerus*, *Orthocera* and crinoid stems.



The strata seem to dip from this point in almost every direction, perhaps with an exception in favor of areas to the N. N. E., as rocks stratigraphically higher are seen east, west, and south.

#### ECONOMICAL GEOLOGY.

The alluvial soils along the Wabash, Tippecanoe, and other rivers, with the terrace prairie land in the southwest part of the county, form a large area of fertile land, on which good crops of corn, oats, and grass, are raised. The northern part of the county is sandy and is not much improved, but yields pasture free to all, beyond the wants of all the cattle of the vicinage.

Large quantities of wild grass is annually made into hay and shipped by rail to neighboring cities.

Near the center of the county, and west of the Tippecanoe river, is found a loamy soil, once interrupted by slashes and ponds, but when drained is well adapted to stock raising. Fine herds of cattle were noticed. Blue grass (*poa pratensis*) is indigenous, and with a little care forms a strong sward.

#### TIMBER.

A sufficient for past and present wants has been obtained in the "oak openings" and along the streams. East of Monticello, I am informed, timber is abundant and of excellent quality.

#### MINERALS.

Some money has been spent in this county shafting for coal, but, of course, without result, as the rocks found at the surface, in this county, are from five hundred to nine hundred feet below the coal measures. Petroleum is noticed in the porous limestone, but so minutely distributed that, although the quantity is large, it is not possible to collect it in paying quantities.

Below the soil and drift material, an unlimited supply of stone is known to exist. At no distant day it will be brought to the surface by shafts and utilized.

## ROAD MATERIAL.

Gravel for road-making, of the best quality, is abundant. At a little expense, good roads may be made.

## BOG ORE.

In the sloughs and swampy prairies in the north and northeastern parts, large beds of bog ore of iron are known to exist. These were formerly baked without smelting at the Logansport forge, but the long transportation of the ore by wagon soon put an end to the enterprise.

## WATER POWER.

The Tippecanoe river flows from north to south, nearly through the center of the county. The water is pure and clear. Pebbles may be seen at great depths beneath the surface. Fish are as plentiful as in our more northern lakelets.

In size it is as large as the Wabash where it flows into that river; and in its flow through White county, the engineers engaged in locating the Wabash and Erie Canal found there was a descent of ninety feet, or nearly four feet to the mile.

A stream of this size, with this amount of fall, is a mighty source of power, and although now flowing idly by, yet in the early future, we may expect to see these idle waters vexed by dams and turbines into vigorous laborers. The power is sufficient for grist, saw, paper, cotton, or woolen mills, and generally two or more mills may be driven by a single dam, while, by reason of the rapid descent, a dam may, with advantage, be located every two or three miles along the river.

Water is the cheapest possible power. A dam, alone, is needed, which ought not to exceed the cost of a steam engine of an equal power. The expense of running, cartage, engineers, and skilled employes, is avoided.

The situation comprises health, comfort and cheap food

and cheap homes for operatives. It is believed these facilities ought to command the attention of capitalists, and that in value they are equal to a coal bed occupying a space commensurate with the valley of the Tippecanoe river. Minimum supply of water, 17,000 cubic feet a minute; maximum, for nine months of the year, 47,000 cubic feet.

#### ANTIQUITIES.

This county was the favorite home of the Mound Builders. Their tumuli are seen along the river wherever good farm land was found convenient to water, river transportation, etc.

At the village of Bedford was noticed a cluster of these mounds, nearly ten feet in height. One of the largest has been excavated and used as a lime kiln. Quite a number of mounds, three to five feet high, were noticed where the Monticello road crosses Little Mound creek.

#### CARROLL COUNTY.

At the close of the glacial epoch this county was probably a level plain. Since that time the Wabash river and its tributaries have eroded a very considerable amount of clays and bowlders deposited by the great ice flow, forming a valley in this natural plain from ten to twenty miles wide, and from 100 to 200 feet in depth, and cutting their channel down into the underlying rocks about ninety feet. Hence a great variety of soil is found to exist, ranging from the stiff clays of the boulder drift, through many modifications, to the ancient and modern alluvial loams which are found on the terraces bordering these rivers.

The rocks exposed in this county belong to the Devonian and Silurian age, but it is probable that in the southern parts the subconglomerate knobstone (Waverly sandstone) will yet be found.

The following connected section, combined from measure-  
G. R.—20

ments taken at several localities near Delphi and at the bluff below Pittsburg, will give a general view :

CONNECTED SECTION.

Boulder drift.....	50 to 200 ft. 0 in.
Terraces and gravel beds thrown upon and against the last.....	20 to 90 ft. 0 in.
Louisville-Delphi black slate, Devo- nian .....	50 ft. 0 in.
White alluvium, hard.....	2 ft. 0 in.
Black slate.....	18 ft. 0 in.
Clay shale, light color.....	4 ft. 0 in.
Blue slate.....	8 ft. 0 in.
Band of large concretions .....	2 ft. 0 in.
Black shale .....	12 ft. 0 in.
Band of concretions.....	1 ft. 6 in.
Drab shale.....	10 ft. 0 in.
Gray shale.....	3 ft. 6 in.
Devonian limestone.....	22 ft. 0 in.
Pentamorous limestone, silicious.....	30 ft. 0 in.
Petroleum limestone, silicious.....	20 ft. 0 in.
<hr/>	
474 ft. 0 in.	

The black slate is a prominent feature of the foregoing section. Although the exposures were disconnected, yet combined, they afford a view reaching from the bottom to within a few feet of the upper layer. The name is established in geological nomenclature, but is hardly significant. The slate is, at exposures, a brownish-gray shale with considerable iron finely disseminated. Bituminous matter is present, with petroleum in small quantities, and bituminous tar or albertite in fissures and partings. No fossils were noticed in the upper beds. In the lower beds, Mr. George Vandeventer, reports having found some fern leaves. Breaking open the concretions locally known as "boulders," obscurely marked trunks of *Lepidodendron* and *Stigmaria* were found, the spines of the latter containing petroleum.

Both were probably of new species. In another boulder, I found large teeth of a fish belonging to the shark family. This horizon is rich in fish remains, and further exploration will richly reward the scientific worker.

Immediately below the slate, a coarse impure limestone is found, twenty-two feet thick when seen. It is of little economic value, but has been used for foundations and rough walls. It contains *Cyathaphylloid* corals, *Spirifer auritisma*, *Atrypa reticularis* and *Chonetes setigera*.

The pentamerous bed is an irregular deposit, variable in its mode of occurrence and thickness, evidently deposited by currents flowing across inequalities in the surface of regularly deposited rocks below. It is generally found thrown upon or against these inequalities, and consequently this deposit exhibits remarkable peculiarities of false bedding. The lines of deposit are never horizontal, sometimes nearly vertical, and at all angles between their directions. This phenomenon is often pointed at as the effect of subsidence and upheaval, but may be easily and more truthfully accounted for by studying the mode of deposit peculiar to this bed. The stone is crowded with casts and fossils, the animal matter being wholly removed, as *Pentamerous Knightii* large and very abundant, *Halysites catenulata*, corals, crinoid stems and *Bryozoans*.

The lower part of the bed is burned for lime, and furnishes an article of high grade in the market. The lower bed is but partially explored at the quarries. It is similar to the last, but being free from animal and mineral impurities, presents a superior article of lime. Only a few fossils have been found, all being of the Niagara epoch of the Silurian age.

#### ECONOMIC GEOLOGY.

About two-thirds of the area of Carroll county is upland variety, the modified material of the boulder drift. Descending from the highest table land, 250 to 270 feet above the Wabash, we find on approaching that river the soil becomes

more loamy, with beaches and gravel terraces, marking the ancient channel of the river from eighty to one hundred and ten feet above its present bed. The whole county was originally clothed with a good growth of excellent timber, including White, Black and Red Oak, Walnut, Poplar and Maple. Good crops of corn, wheat, oats and hay are produced. Blue grass thrives, and apples, sound and of large size, were abundant.

#### BRICK CLAYS.

The clays of this county are largely composed of the pulverized *debris* of the black slate. This gives plasticity to the material, and adds a perceptible amount of iron, which paints the bricks here made, with an indelible, ruddy color. A stranger will at once notice that the city of Delphi has the appearance of a new town. Although some of the houses have been exposed to the weather for twenty-five years, the brick walls are as fresh and brightly colored as of yesterday. This building material deserves the notice of architects, as it is believed to furnish a product equal to any in the Union.

#### BUILDING STONE.

Good rock for this purpose is not abundant. An inferior article, quarried near, and in Delphi, the county seat, is used for foundations and rough masonry.

#### LIMESTONE.

Several mines are opened and extensively worked in and near Delphi for burning. The lime produced is of good quality, and is a specific article of trade known as "Delphi Lime." It sets slow, or in mechanical terms "works cool," allowing the mechanic time to spread his plaster, or lay mortar over a large space before "setting," and thus secures complete contact with adjoining surfaces. On "setting," the cement adheres well, and becomes as hard as stone, often more compact than brick. The burned stone does not air-slack readily and consequently affords ample

time to facilitate transportation. Seventy pounds of this lime, I am informed, is considered equal to eighty pounds of other Ohio or Indiana limes.

The following firms are engaged in the business, with appliances and productions as follows, viz.:

Cartwright & Co., use three common kilns, and one "Donnelson Perpetual Burning Kiln." Their product for the current year will amount to seventy-five thousand bushels. Reported cost of manufacture by common kilns, sixteen cents, and with patent kiln, ten cents per bushel.

At Springfield, Illinois, I am informed, that lime from this firm was used in the construction of sewer walls in the place of hydraulic cement. At the expiration of one year, the wall, although exposed to water, was found to be compact and in a satisfactory condition.

E. W. Hubbard & Co. mine their stone from the lower member of the Pentamerous limestone, at their location, about twenty feet thick. The strata dip in every direction, and at one part of the mine are nearly vertical. A band of porous stone is seen near the water level containing petroleum, which oozes out on exposure to the warmth of an October sun.

Hubbard & Co. have twenty common kilns and two "Monitor Perpetual Burners," Pelton's patent. The capacity of the common kilns amounts to 150,000 bushels (of seventy pounds) per annum. The common kilns are now only occasionally in work. The capacity of the two "Monitor Kilns" is estimated at 500 bushels a day, and are intended to run nine months in a year. The greatest product in one year is reported at 150,000 bushels.

F. Shelly & Co. use four common kilns having a capacity for burning 160,000 bushels per annum; one "Shelly's Perpetual Burner," which burns 200 bushels a day, or 66,000 bushels per annum.

The expense for mining is 35 cents per yard; of burning by common kiln 16 cents per bushel, and by patent kiln 10 cents per bushel, of 70 pounds. The product for last year was 150,000 bushels. Specimens from all the different

mines were secured for the State cabinet for exhibition and analysis.

#### PAINT.

The black slate, at many localities in the United States, has been pulverized and used as a paint or for plastic slate roofing. Here this deposit is well suited for this purpose, and unusual facilities are offered for mining the crude material and for manufacturing by means of water-power. B. F. Tea, in the year 1866, bought of experienced manufacturers a lot of fixtures for the manufacture of fire and waterproof paint, and commenced the business a short distance south of Delphi. The slate was ground up as quarried from the exposed bluffs without any washing or other purifying process. The capacity of the mill was reported at 50 to 60 barrels per day. Large amounts were manufactured and sold at a handsome profit, until the sudden death of the proprietor put an end to the enterprise.

A specimen of roof paint, in a trying situation, showed good qualities after six years exposure to sunshine and storm. Another mill established by G. Vandeventer Esq., in 1867, just below Pittsburg on the west bank of the Wabash, after grinding a few barrels of paint, was suspended on account of a disagreement amongst members of the company. The slate at Delphi and vicinity is exposed along outcrops, amounting to about ten miles. Thickness of the bed 100 feet. An unlimited supply may be obtained.

#### ROAD MATERIAL.

Gravel is abundant and of the best quality. Beds fifty to sixty feet thick are seen at several localities along the river. It is derived from the boulder drift. Experience has shown this to be an excellent article for making roads.

#### WATER POWER.

A short distance above Delphi, the Wabash river is dammed to supply the Wabash and Erie canal. After serving this



purpose, a large surplus of water is left for manufacturing purposes. The present year, 1872, is known as the greatest season of drouth ever known. During this year, the amount supplied by the canal company to mills at different points is as follows, viz.:

Delphi .....	4,000 cubic feet.
Pittsburg.....	4,000 cubic feet.
Lafayette.....	4,000 cubic feet.
Not used.....	3,000 cubic feet.

For an ordinary season of low water the quantity *not* used amounts to 10,000 cubic feet. This supply is quadrupled during two-thirds of the year. It may be seen that this power, cheap, certain and effective, will prove a great source of wealth, and that this large amount of unused power will soon be utilized. Amount of fall secured by Pittsburg dam is thirteen feet. Connected with this power are woolen, saw and grist mills, at Pittsburg, and flax, paper and other mills at Delphi.

## CASS COUNTY.

The grand features of this county are similar to those of Carroll. The Wabash river flows from east to west near the center, and Eel river, from the northeast, enters the same at Logansport, the county town. Hence there is found bordering these streams a large area of loamy alluvial soil of great excellence. Large crops of corn and wheat are produced; the latter of superior quality. The county was originally covered with a dense growth of timber, and the quantity and quality of that still remaining, is worthy the attention of the workers in wood.

The rocks of this county are of upper Silurian age, with outlines of lower Devonian. The southern part of the county was not visited where it is probable the latter formation prevails, although generally buried beneath the drift.

## CONNECTED SECTION.

Soil.....	2 to	10 ft.
Modified drift.....	10 to	20 ft.
Boulder drift.....	120 to	30 ft.
Devonian black slate, (reported).....		30 ft.
Devonian limestone.....	20 to	10 ft.
Silurian yellow limestone, local.....		11 ft.
Fire stone.....		12 ft.
Fine blue limestone .....	20 to	40 ft.
Silico magnesia limestone.....	10 to	40 ft.

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 203 ft.

The common features of the drift formation are, perhaps, sufficiently described in the remarks introductory to this report, and need not be here repeated. The out-crop of black slate reported in the southern part of the county was not visited for want of time, but Mr. D. Keipert reports its occurrence on Deer creek, ten miles south of Logansport.

Richard Owen notes, in *Geology of Indiana*, 1860, an outcrop of Devonian limestone on the Cincinnati road. Southeast from Logansport another bed was seen near the southern bank of the canal, three miles east of town, rich in beautiful specimens of *Favosites gothlandica*, *F. polymorpha*, *Acervularia Davidsonii* and *A. profunda*. These fossils were found abundant, and well preserved. At Mr. D. Keipert's lime works, four and a half miles east of town, a still richer Devonian coral reef was seen, containing besides *Favosites* and *Acervularia*, also *Lucina proavia*, *cyathophylloid corals*, and a large *Gasteropod* (indt). The deposit is about ten feet thick. Two lime kilns here obtain stone beneath this bed. R. Donaldson has one "Perpetual Burner," his own patent, which is intended to run eight months in a year, and reports that he has had his kiln in constant use for six months at one time, without allowing his furnace fires to cool; capacity and product, 200 bushels per day, or

40,000 bushels per annum. At this locality, D. Keipert has a kiln of same plan and of equal capacity. The proprietors have used coal from Parke county, Indiana, and from Danville, Illinois, in their business; and after a thorough test, find that the Sand creek coal of Indiana burns more freely, is without clinker, and decidedly preferable to the Illinois coal. Mr. Keipert finds that, as a fuel for his kiln, coal is fifty per cent. cheaper than wood, and that when block coal is used, the product is fully as pure and free from color as lime from a kiln in which wood is used.

The lime costs, for quarrying, wear and tear on tools and fixtures, fuel, etc., twelve to fifteen cents per bushel of eighty pounds, and is sold at the kiln, by the car load at from eighteen to twenty cents per bushel. It is known by masons as a "hot" lime—begins to "set" quick, but requires from ten to twenty days to thoroughly harden. At each of the mines, strata, containing petroleum diffused in minute pores or collected in small crevices, are seen, and occasionally a cavity is broken into containing several pounds of bitumen. On William Dunn's land adjoining is found a bed of snow white sand stone, suitable for making glass, and also a thin stratum of lithographic stone; samples of each of these rocks were secured for the State Cabinet.

Bowen & Grayen, one mile west from Kerfoot, have a perpetual kiln, Donaldson's patent, having a capacity of 200 bushels a day, and for a year of eight months of 50,000 bushels.

The strata mined here and at the localities throughout the county, are either lower devonian or upper silurian, and almost invariably from near the junction of the two formations.

Below the lime rock beds is a thick deposit of buff colored rock, often locally called "free stone," termed in Owen's report the "silico magnesia limestone." It contains little or no lime, but in position, color, and mode of occurrence, is exactly similar to the famous buff colored stone obtained at the Anamosa quarries in Iowa, and used so extensively, and with such good architectural effect in that State. At

the weathered outcrops the stone does not make a favorable appearance. The same is true at the quarries above mentioned; but, as at the Anamosa quarries, it is believed that on uncovering the stone deeply protected from atmospheric action, good beds will be discovered. The following section at the head of Cedar Island, shows some massive bands worthy the attention of quarrymen.

## SECTION AT CEDAR ISLAND.

Roughly weathered white limestone.....	4 ft. 6 in.
Irregular and amorphous stone.....	14 ft. 0 in.
Thin bedded " <i>silico magnesia</i> ".....	4 ft. 6 in.
Heavy bedded " <i>silico magnesia</i> ".....	11 ft. 6 in.
Banded limestone with petroleum and tar.....	1 ft. 6 in.
	<hr/>
	36 ft. 0 in.

The Wabash river here flows over a solid floor, part of which indicates good quality for building purposes; while the "*silico magnesia*" limestone in the precipitous bluffs of the island is distinctly and heavily bedded, and more compact than at many other points. "Rostrum Rock," on the Indiana Reservation, on the south bank of the river, is a truncated pillar standing alone in the forest. Other quaint remnants of the *silico magnesia*, capped with white limestone, are seen in the adjoining forest, attesting at the same time the enduring qualities of the stone and the erosive power of the river. On the canal, half a mile west of Lewisburg is a very extensive bed of gravel as below noted:

## SECTION NEAR LEWISBURG.

Soil and clay.....	5 ft.
Fluviatile drift.....	10 to 20 ft.
Black clay.....	14 ft.
Gray clay.....	2 to 5 ft.
Clay and gravel to canal.....	35 ft.
Gravel to river.....	20 ft.
	<hr/>
	99 ft.

At John Castenborden's mill, on Pipe creek, one and a half miles south of Lewisburg, is a heavy bed of buff silico magnesia limestone. Precipitous outcrops confine the stream on each side, having a thickness of 15 to 20 feet. The stone is compact, may be quarried in large blocks, and has been used for foundations and for piers in the Lewisburg bridge. It is more calcareous than at other localities, seems to weather well, and contains *Pentamerus*, *Bryozoans*, and Silurian coral. One mile south of Logansport is an outcrop of stone, principally thin bedded, known as the "Fire Stone Quarry." This stone has, in an extraordinary degree, a capacity for resisting the effects of heat. It has long been used for the back-walls of fire-places in houses, and the parts exposed to excessive heat in furnaces, successfully and profitably. For the former use it would be a desirable convenience to those who still wish to enjoy the luxury of open fire-places. It contains the following fossils which assign it a position near the line separating the Silurian and Devonian formations, viz.: *Atrypa reticularis*, *A. nodostriatus*, *A. aspera?*, *Platyceras dumosem?*, *Spirifer Niagarensis*, *Calymene*, *Blumenbachii*, var. *Niagarensis*, and *Bryozoans* of the genera *Clathrepora*, *Retapora*, and *Fenestella*, with Crinoid stems, plates, etc.

John Lux has opened a quarry less than a mile further south. He obtains a stone which comes from the quarry soft and easily worked, but hardens on exposure. It is granular in structure, has much the appearance of sandstone, but on application of acids shows that it contains little or no silex. Mr. Lux reports a bed of fire stone in the bottom of his quarry.

The "silico magnesia," or buff-colored limestone mentioned as occurring at Cedar Island and on Pipe Creek, passes entirely beneath the bed of the Wabash at Logansport, but to the west this rock is soon found above the surface, and within a few miles attains a thickness of from twenty to forty feet. The quarry band is from four to twelve feet thick, and is broken by an irregular, vertical cleavage into masses containing from four to twenty cubic

feet. This stone, obtained at the Priest's and other quarries, was used in the piers of the T. W. W. Railroad bridge across the Wabash, and seems to weather well.

Still further down the river, and on the south bank, La Rosa and Nash have an extensive outcrop which is worked by ten different firms.

#### SECTION AT LA ROSA AND NASH'S QUARRY.

Gray porous limestone.....	40 ft. 0 in.
Shelly buff silico magnesia limestone.....	4 ft. 6 in.
Solid buff silico magnesia limestone.....	12 ft. 0 in.
Compact brown silico magnesia limestone .....	15 ft. 6 in.
Hard blue limestone, with odor of petroleum and streaks and masses of tar in partings and cavities to the water line.....	? ?
	<hr/> 72 ft. 0 in.

When the dam and mill justify systematic work and the quarry is opened so thoroughly as to discover beds unexposed to atmospheric influences, it is believed that a stone satisfactory in quality and of that beautiful neutral tint, so desirable for architectural effect, will be secured. The surface exposures at the Anamosa quarries of Iowa are not more promising than these we now find here. It is to be hoped that a tunnel driven back into the hill will discover stone equal in compactness and beauty to its Iowan equivalent.

North of the Wabash and near the Logansport and Peoria Railroad, this stone is well developed, and has been worked on the lands of Major Dunn and Mr. Watts. At Falry's quarry, a darker stone is obtained with the same carbonaceous markings and the usual odor of petroleum. A trainway, about a quarter of a mile in length, carries the product to the railroad.

Calvert's quarry, two and a half miles east of Georgetown, gives the following section, which shows the blue limestone

unconformably deposited upon the silico magnesia, with a small parting of clay. This parting is general and is often drilled to some twenty to thirty feet below the surface at Logansport for a supply of water :

SECTION AT CALVERT'S.

Gray limestone.....	10 ft. 0 in.
Clay parting.....	2 in. to 0 ft. 10 in.
Irregular bedded limestone.....	1 ft. 0 in.
Clay band filling inequalities on surface of the Argo. magnesia limestone.....	1 to 1 ft. 6 in.
Silico magnesia limestone.....	15 ft. 0 in.
	<hr/>
	28 ft. 4 in.

Large masses of calc spar were seen at this quarry, filling pockets in the stone.

North and west from Calvert's, is Rochester's quarry, from which is obtained the stone known along the canal as the "Georgetown stone," and which has been used so extensively in the construction of abutments, piers and copings along the canal, river and different railroads. A good test example of the quality of the stone is seen in the walls and columns of the county court house which was built twenty years ago. This quarry has been worked ever since the completion of the Wabash and Erie Canal, a period of nearly forty years. About sixty acres have been exhausted, but in adjoining ones the supply is unlimited. The stone is obtained in complete slabs of large size, varying from six inches to two feet in thickness and when burned makes a fair article of white lime free from chert. In partings between the upper strata are seen millions of small shells like *Zygospora*. A stratum from two to four inches thick of lithographic stone is also found here, which experts declare to be of good quality.

Major Dunn's quarry on the Dunn homestead, was extensively worked in former times. On the opposite side of the river from La Rosa's quarry, the stone is of the same color, and may be quarried in large blocks. Stratigraph-

ically this is the most elevated expanse of the silico magnesia limestone seen in the county. From this point, the strata dip in every direction, and rapidly to the north and northeast. The hill is capped with eight to twelve feet of gray limestone, with an expanse of quarry rock thirty feet thick. On the same farm, Major Dunn showed me a locality more than five acres in extent, where the solid rock is rent by fissures from one to two feet wide and ten to thirty feet deep, having a direction generally from northeast to southwest. The same ground is also pierced with round holes, two to three feet in diameter, reaching perpendicularly down to an unknown depth. This singular phenomenon probably owes its origin to the corroding action of rain or rain water charged with carbonic acid gas.

E. N. Talbott & Co., adjoining the Dunn farm, and one and a half miles from Logansport, are most extensively engaged in the business of burning and shipping lime. They own sixty acres of land, and paid for it by mining and burning; the bed of stone is at least forty feet thick. The product is highly caustic, and has been used by the gas companies of Peoria, Pekin, Logansport and Lafayette exclusively for several years as a deodorizer. It is a good plasterer's lime when well slacked, and makes a hard, compact wall, not liable to "pop" from subsequent exposure to the air. For masons' use it is superior, making a cement in walls which is generally harder and more enduring than common bricks.

The company use, at times of extra demand, two common kilns, with a capacity of 1600 bushels a week, besides their regular and reliable patent kilns. Of these they have three—two "Monitors" and one of "Shelby's patent"—having a combined capacity for turning out 700 bushels a day for nine months of the year, or 200,000 bushels per annum. Actual product for current year, 100,000 bushels. Talbott & Co. use coal and wood for fuel in equal quantities, and find that Sand creek coal, from Parke county, Indiana, is fifty per cent. more economical than the exclusive use of wood. Their experience shows that Indiana



coal burns freer, without "lodging," and is forty per cent. cheaper and better than Illinois coal, which cakes and "clinkers" excessively. Their lime, as it comes from the kilns, costs from thirteen to fifteen cents per bushel, and sells, delivered on the cars, at twenty-three cents for eighty pounds. R. D. Eggleston, Superintendent, informed me that at the time of my visit, the company had orders for twenty car loads more than could be filled at that time.

## SECTION AT TALBOTT'S MINE.

Soil .....	1 ft.
Fire stone.....	1 to 2 ft.
Gray limestone, with pockets and seams of calc spar, a strong odor of petroleum, and partings and masses of bitumen....	12 ft.
Same, more compact, as found in test fire.....	48 ft.
	<hr/>
	63 ft.

The stone is compact, free from chert, obscurely laminated, and well adapted for burning.

One of the kilns mentioned above as Monitor kilns, is of great size and known as the "Mammoth Monitor." It has a furnace base 20×22 feet square, Jeler fire chamber with side draft heaters at opposite corners, ash box and "drawing" reservoir below, built of stone and fire brick; above is an iron cylinder made of tank iron, one-sixteenth of an inch thick, twenty-two feet high and fifteen feet in diameter, lined with fire brick or other non-conducting material with an oval stem pit five by eleven feet. This kiln, which the proprietors believe is not excelled by any in the Western States, has a capacity for burning 500 bushels a day, and cost, with appurtenances, \$4,000.

Logansport is well supplied with water-power. The whole volume of the Wabash river is controlled by dams and brought by canal and a race to the city, and compelled to serve its master, man. The numerous railways centering

here have erected machine shops which cover acres of land, and the walls of which, I am informed, exceed four miles in length. Timber in abundance and of superior quality for the manufacture of wagons, carriages and other agricultural machinery. These advantages are elements which insure to to this locality a broad future.

R. S. J. Green & Co., established iron works four miles east of Logansport, in the year 1856, or 1857, at the canal lock, using water leased from the canal, for motive power. The Company used bog ore from White county, which was roasted, sifted, and heated in a Catalan forge, and then hammered into blooms by machinery. The ore, by analysis, was at least sixty per cent., but by this process the product only averaged thirty-seven per cent.

The forge was in operation about a year and a-half. The maximum product for a single month was one hundred tons. The enterprise was not profitable, because of the great expense of long transportation of the ore from White county in wagons.

#### EDUCATIONAL.

In addition to the common school facilities, *Smithson College*, under the direction of the Universalist Church, is situated upon the summit of the commanding hill immediately west of Logansport. The college edifice at present, is only a part of an elaborate design, planned so that additions may be made from time to time, as exigencies may arise, and consists of a building one hundred and forty feet long, having a transept seventy-three feet long, all four stories high.

The kitchen and other offices adjoin, others seem detached. These furnish accommodations for eighty boarders.

Both sexes are equally welcome to the advantages of this institution.

The building is heated by steam, and lighted with gas made on the premises, thus giving extra security against the hazards of fire.

An efficient corps of professors, under the direction of President P. R. Kendall, promises thorough educational facilities.

## MIAMI COUNTY.

This county is traversed from east to west by the Wabash and Eel rivers and the Mississinewa passes across the southeastern part. As a consequence a considerable part of the county is alluvial, fertile and productive as such soils usually are. The surface outlines represent the features common to the counties hereinbefore described, except that the deposits of fluviatile and boulder drift are not so thickly laid down.

The rocks which were seen, and probably all the rocky exposures of this county, are of upper silurian age, and seem to be equivalent to the silico-magnesia limestone mentioned in the description of Cass county, and the overlying limestones; the first mentioned beds much more argillaceous than in Cass county—in some cases becoming a magnesian argillite.

The highest seam exposed is a limestone equivalent to the rocky band at Delphi in Carroll county. A light brown colored magnesian limestone, which, from false bedding, is often seen with strata dipping at every angle almost to a perpendicular. In fact this apparently disturbed condition is often referred to oscillations in the earth's crust instead of the true solution. This bed was formerly burned for lime at Duke's quarry, adjoining Peru, the county town, but the kiln is not now in use. It is crowded with skeletonized fossils, yet still retaining a sufficient modicum of animal matter to prevent the lime from so fully slackening in the short time usually allowed for that purpose by workmen. Hence, this lime is not suited for plasterers' use, unless the mortar is permitted to remain in damp vats several months before being spread upon the walls of houses. This is too slow a process for our fast age. Yet the Roman architect who built for ages, would only use

mortar which had been prepared a year or more before it would be needed by the artificer. The fossils contained were Crinoid stems, plates and heads, *Pentamerus Knightii* and *Occidentalis*?, *Platyceras*, *Bumastis*, *Barriensis*, *Calymene Blumenbachii* var. *Niagarensis* and corals.

Beds of this stone are generally local and of no great extent but an outcrop, somewhat purer and ten or more feet in thickness, was formerly worked a mile to the north on the farm of E. H. Shirk, and appearances indicated that this stone could be found in all the intervening area. Similar beds of stone are well developed at John Trippier's, two miles east of Peru and south of the Wabash river; and at Wallack's mill on the Peru and Indianapolis Railroad, containing the fossils mentioned as occurring at Duke's quarry, with *Favosites* and *Cyathophylloid* corals, *Halysites catenulata* and *Bryozoa*.

At both of these localities, lime is burned for exportation as well as local use. It is similar if not equal to Delphi lime, slakes perfectly, works "cool," bears transportation well, makes a strong and almost hydraulic cement, and deserves a more extended market.

Below these beds of lime rock is found stone which I have called "silico magnesia limestone," adopting the name applied to it by R. Owen (Geology of Indiana, 1860.) The upper beds are similar to those mentioned and described in my report on Cass county. A surface opening has been made at Duke's quarry in the northern part of Peru, and it is believed that although a first rate stone has not been produced yet because exposed to the action of drouth and winters for many thousand years, but when mining operations shall have been extended to parts not exposed to atmospheric influences, the product will prove much more satisfactory.

Lower beds of stone are found along the river. This is worked at Lyde's quarry, two and a half miles west of Peru, in the low bank and bottom of the river. It is distinctly laminated, or divided by partings containing pyrites and argillaceous matter. Protected from the weather, this will serve for foundations; but on exposure the argo-pyrite

decomposes, and breaks the rock into small shelly fragments. The stone quarried at Tracy's for foundations, although less argillaceous, ought not to be exposed to extreme changes of temperature and moisture. Near the mouth of the Mississinewa are extensive beds of rock suitable for building, showing an outcrop of more than one mile. On the right bank is the brick residence and well-appointed farm of Godfrey, chief (and son of the distinguished leader) of the Miami Nation of Indians. Across the valley is the Osage village, once the residence of Chief Pecan, who was distinguished as statesman and warrior, and lived to the extreme age of one hundred years, universally respected. Many Miami Indians still live in this county, descendants from the princely line of chieftains who bravely led this once powerful Nation in its ineffectual struggle for supremacy.

Ascending the Mississinewa to a point three miles east of Peru we find the "Pillared Rocks" full of geological as well as romantic interest. Here the river flows directly to the north and infringes against a solid wall of cherty silico magnesia limestone, and diverted from its course flows thence to the westward. The action of the rushing river and unequal disintegration of the rocks has carved the precipitous wall, which diverts the river's course, into a system of pillars, rounded buttresses, alcoves, chambers and overhanging sides, ever beautiful and interesting. The whole is covered with evergreen cedars. It is a picnic ground widely known and justly celebrated. In the overlying gray limestone an *Orthoceras*, two feet long, and an obscure Crinoid head, not less than six inches in diameter, were seen. The main wall of stone is straw color, the neutral tints of which contrasted well with the autumnal foliage, at the time of my visit, of scarlet, gold and crimson.

Still ascending this stream we find a wall-like precipice bounding this river on the north side. On the farm of H. H. Hahn, the following section was taken :

## SECTION ON MISSISSINEWA, AT HAHN'S FARM.

Soil, sandy.....	4 ft. 0 in.
White glass and grit stone.....	10 ft. 0 in.
Porous lime rock.....	3 to 18 ft. 0 in.
Cherty laminated argillaceous limestone to river.....	35 ft. 0 in.
	<hr/>
	67 ft. 0 in.

The porous limestone of this section is not easily broken. Blocks of a large size may be obtained, and the unexplored beds, if found sufficiently compact, will prove valuable for quarry purposes, as well as for "burning." This deposit shows much false bedding, and dips to the south at an angle of twenty degrees.

At Thomas' quarry, in the pool of Peoria mill dam, fine square blocks of stone are quarried at the water's edge, below the cherty division of the silico magnesia division. This is the best stone seen in the county, but being at or below the ordinary water line, it will be difficult, if not impracticable, to prove its value.

Still higher on the Mississinewa, near Brouillette's, a quarry was opened, and stone obtained for pilaster coping for the Catholic Church at Peru. The modest, neutral tint of this stone contrasts well with the ruddy brick wall, and promises to weather well. This bed will justify its development, as it is very similar to the Delphos stone brought from Ohio.

## MILLS AND MANUFACTURES.

The Wabash, Eel, and Mississinewa rivers, flow with a rapid current and offer a large amount of valuable water power, which is only partially utilized. Here is a large field for enterprise that should be made available.

The manufactories of Peru are in a flourishing condition, and, as I am informed, at the same time remunerative.

The Peru Woolen Mills, H. E. & C. F. Sterne, proprietors, is an extensive factory. It is described as a "six set" mill, with twenty-eight looms, and gives employment to one hundred hands. They make jeans, cassimeres, and cloths, to which have been awarded the highest premiums, in competition with the best manufacturers.

Gardner, Blish & Co. make "split" baskets out of oak, ash, and elm trees. They employ ninety hands at the factory, and ten or more engaged in outside work. Their wares meet a ready market, a sure proof of excellence.

The Howe Sewing Machine Company have a branch manufactory at this place. Nine hundred machines are made daily, or an equivalent amount of material prepared. They employ 450 operatives in this work. To this may be added three founderies, four wagon and carriage shops, with grist, saw, and planing mills, with capacity equal to the local demand. Timber is sufficiently abundant to supply all these establishments with material for work, with a large surplus to invite many additional manufacturers of wooden articles. The Peru Flax Mill and Bagging Factory, another new enterprise, consumes the ripe straw after the seed is threshed; employs eighty operatives. Their stock and manufactured articles often amounts in value to more than \$20,000.

Gravel, the best road material, is plenty along all the rivers which traverse Miami county, some of which has already been used in making gravel roads.

## WABASH COUNTY.

Wabash county is traversed by the same rivers, in the same direction, and in general outline is almost a counterpart to Miami county, just described. The rock exposures are beds equivalent to those seen in that county, but extending to a lower division of hydraulic limestone and sandstone. Although the rocks are equivalent beds, they are changed in character. The upper or porous limestone is more silicious, but exhibits the same remarkable system of

false bedding, so often wrongly referred to as an upheaval or subsidence of the earth's crust. The gray limestone, seen at Logansport and at a few localities in Miami county, first becomes laminated, then cherty, while at Wabash it is thin bedded, and furnishes an unlimited amount of the best of paving stones. The silico magnesian beds of Logansport part with the greater portion of the calcareous matter at Peru, becoming argillaceous, while in Wabash county this bed is characteristically argillaceous, and in appearance very similar to the hydraulic stone at Louisville and other points.

#### GENERAL SECTION.

Soil and drift.....	5 to 90 ft.
Porous lime rock used for burning, and containing Niagara fossils.....	0 to 40 ft.
Paving, stones equivalent to the gray sandstone in Cass county, containing large <i>Cephalopods</i> of the genus <i>Or-</i> <i>thoceras</i> , <i>Cyrtoceras</i> , <i>Trochoceras</i> and Crinoid stems.....	8 ft.
Thick bedded argillaceous limestone, sometimes compact and highly mag- nesian .....	0 to 20 ft.
Hydraulic limestone and 'mud stones'...	10 to 50 ft.
	<hr/> 138 ft.

The porous lime rock presents the same general characteristics noticed in Carroll and Miami counties, and although somewhat silicious, yet the lower strata of this deposit will offer stone equal to that used in the other counties for burning. Lime was formerly burned at several localities, and an attempt was made at a quarry in the northern part of Wabash, the county town, but failed because of using the impure upper beds. At many of these localities, the enterprise was successful, and abandoned only when it was found that common kilns could not compete with the more economical patent ever-burning kilns. The product was of



good quality, and met a ready market. Opposite Wabash, on the south side of the river, J. Hildebrand & Co. have two common kilns with a capacity for each of seven hundred and fifty bushels a week. These kilns were in active and profitable operation, supplying the local market. Good stone for burning was noticed near LaGros, Hanging Rock and at several other localities besides the first mentioned.

The third bed of the general section is next in order. This bed of paving stone crowns the higher hills along the river at Wabash and was found underlying all the adjacent table lands, when not eroded, and is generally about eight feet thick, composed of a hard, pure, gray limestone, sheeted down in layers from two to four inches thick, of almost unlimited extent, separated by thin partings of clay.

This deposit is a great source of income to the citizens of this county. Although but a few acres have been quarried, about one hundred car and boat loads of this stone are yearly shipped to neighboring towns and cities to pave the sidewalks, etc. For this purpose I have not seen its equal, and the universal use which it obtains indicates that the quarries will equal, if not exceed in value, mines of any mineral in the State. The profit on the stone from a single acre is often estimated above \$12,000. At a few localities, the paving stone is interrupted or replaced by heavy bedded lime stone, but at Wabash it rests directly on the hydraulic sandstones; this is an exception to the general rule, although not unfrequently the case in the southern part of the city.

The paving stone bed is rich in large Cephalopods, etc., of the Niagara formation, and of the following genera represented by from two to three species each, but with exterior so worn as to require the experience of a specialist for determination, viz.: *Cyrtoceras*, 3 species; *Trochoceras*, 3 species; *Orthoceras*, 2 species; the interior of the latter shell is often incrustated with *cornulites* differing but little from the common *Serpulae* of the coal measures.

Below these paving stones, and sometimes interchanging, occurs a deposit of thick bedded quarry stone, varying from 0 to 20 feet. Sometimes, however, it is found thrown down

from its legitimate position by the intercolation of the clay sandstones.

This quarry stone has been extensively worked by Major Stearns Fisher, on land now owned by Allen Craft. The product was shipped by canal and used for building locks and piers for bridges and aqueducts, as also for other private and corporation needs. The quarry bed is twelve feet deep, with strata from one to one and a half feet thick. In the shaly partings, between these strata, many *Fucoides* were seen.

On land belonging to Hon. J. H. Pettit, four miles west of Wabash, five quarries have been opened. One of them was being vigorously worked. The product is loaded directly from the quarry grounds on canal boats and shipped to Fort Wayne, Lafayette and intermediate points. The stone is readily quarried in shapely blocks, and meets with ready sale for foundations and hammered masonry. The survey is indebted to the proprietor for fine specimens of *Orthoceras*, *Cyrtoceras*, and *Calymene Blumenbachii* var. *Niagarensis*.

Returning to town we noticed on T. Craft's farm, two miles west of Wabash, a giant boulder—a puddingstone composed of irregular and angular lumps of granite, gneiss, sienite, etc., etc.—fifteen feet long, twelve feet wide and five feet high above the surface. This is the largest boulder I have seen in the State, and shows the wonderful transporting power of the iceberg flow which brought this mass from the north shore of Lake Superior. Other trap and conglomerate boulders were seen near by.

This rock might well command the attention of any people. No wonder that the simple children of the forest looked with wonder at this traveled stone, in their traditions a relic of the battle of the gods, and esteemed it a holy votive altar, on which their offerings of wampum, tobacco, etc., were left to appease the angry divinity.

Another boulder, near the county line east of La Gros, was revered by our savage predecessors as a holy stone, where offerings might be made efficaciously to avert dan-

ger from poisonous snakes, and was known as the altar of the great ruler of the serpents.

At Beck's quarry, two miles west of Wabash, about 1846, Robert Helm experimented with the hydraulic limestone there found. He burned, ground and sold a quantity. Generally, this lime when used without directions, proved a failure; but in all cases where mixed with a proper proportion of well slaked caustic lime, it proved a perfect cement. Mr. G. L. Dart, of Peru, used this cement in making a cistern. Eleven years afterwards he had occasion to remove this cistern, and found the walls in the best possible condition. The cement, as he reports, was harder than common bricks.

Experiments have been made with stone from equivalent beds obtained a short distance east of Wabash and from the bluffs of Treaty creek, with varying results. A few products of the trials hardened well under water, as I am informed by Dr. Ford, but generally I may say that the material examined by me was too argillaceous, and contained too small a proportion of lime. This difficulty may be easily remedied, as beds of stone, suitable for burning are abundant, and the property wanting may be cheaply added. In a commercial point of view this deficiency would be no detriment, as lime is a common and cheap product the world over, and may be added more cheaply, when used, than at the original place of shipment.

Full experiment will be necessary to first definitely fix the exact proportion of lime to be added. This experiment ought to be conducted under the charge of some patient citizen at the public expense. The results ought to be the property of the county. By this means a bed of material found throughout the county would become a great source of income. The supply is unlimited, as may be seen in sections hereinafter given. I add the analysis, of the sample, made by Dr. Ford :

## WABASH CEMENT.

	No. 1.	No. 2.
Silica .....	30	27
Carbonate of lime.....	40	42
Carbonate of magnesia.....	19	18
Alumina and iron.....	5	4
	<hr/>	<hr/>
	94	91

This analysis was probably not made of an average specimen, as the results of analysis made by Professor Cox shows the per centage of lime to be less than five per cent., while the per centage of alumina is much larger.

The following section, taken at Wabash, and including lime exposures in that vicinity, gives a general view, as the rocks vary much at short distances :

## SECTION AT WABASH.

Soil and drift.....	16 ft.
Paving flags.....	8 ft.
Blue clay.....	2 to 4 ft.
Place of the porous limestone.....	0 to 15 ft.
Thin bedded sandstone.....	10 ft.
Blue hydraulic, argillo-magnesia limestone, weather buff to brown.....	30 ft.
Heavy bedded argillaceous lime rock, with a few large gasteropods like <i>Pleurotomaria</i> and <i>Fucoides</i> , to water line.	20 ft.
	<hr/>
	103 ft.

The lower beds in the above section have been quarried for building the railway bridge in the east part of town. In appearance it is much like the Flat Rock stone, and the quality seems good. But from the large amount of clay contained, it is probable that some of this may disintegrate. Samples from this and similar beds throughout the county were secured for the State Cabinet, and complete analyses will be made as soon as office duties will admit.

At Small's mills, on Treaty creek occurs an anticlinal

axis, (fig. by R. Owen, Geology of Indiana, 1860,) with the superimposed limestones bedded down upon the ridge, and dipping at a high angle to the north and to the south. The line of strike is nearly from east to west, varying a few degrees to the northeast. This ridge is marked by a line of high land or sharp hills traversing the county for miles parallel with the Wabash river, and crossing that stream, as I am informed by Dr. Ford, near the line dividing this from Miami county. Mr. Small presented some fine hexagonal and prismoid masses of calc spar, with a specimen of *Cyathophyllum rugosum*, from a small Devonian outcrop at the top of the hill.

At Wilson's bluff, four miles east of Wabash, is a bed of hydraulic argillite fifteen feet thick. This place offers good facilities for shipping by canal or railway. A similar bed of equal thickness was visited on Chappelle creek in the northern part of La Gros. The specimen had the appearance of good cement stone. The analysis hereafter to be given of the specimen secured, will show the chemical constituents.

Near the mouth of the Salamonina and near its confluence with the Wabash is a cluster of sharp, conical mounds, 100 feet or more in height, formed by the erosive action of the rivers. One is acutely pointed and sugar-loaf in shape. Another, not over 200 feet in diameter at the base, and has one side rudely torn away by the Wabash which flows at its foot, is known as the hanging rock. This is a favorite picnic ground. Lovers still meet here and climb the same pathway to felicity "that their fathers trod."

#### SECTION AT HANGING ROCK.

Compact porous limestone irregularly bedded, and dipping N. W.	
at 45°.....	60 to 25 ft. 0 in.
<i>Spherexochus</i> and <i>Culymene</i> .....	3 ft. 0 in.
Cherty argillite.....	10 to 60 ft. 0 in.

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Horizontal clay stones.....	8 ft. 0 in.
Choice blue limestone to river bank .....	5 ft. 0 in.
	<hr/>
	101 ft. 0 in.

A flat space, some forty feet square at the summit, affords room for a festal spread, and commands a broad outlook over the river and valley below.

The Mississinewa traverses the south part of the county from east to west. It is here a mill stream, highly valued as such. The rapid fall offers many valuable locations for mills. In early times, before the day of railways and other means of transportation, this stream was the highway of commerce. The people of Delaware county, at the eastern border of the State, I am informed, at the time of spring floods, would, by the Mississinewa, the Wabash, the Ohio, and the Mississippi, find a long, tortuous way, to New Orleans. A voyage of months, but then the only outlet for the cheaper products of their farms.

On Phil Davis' farm, one mile northeast of Somerset, this stream is confined by a precipitous wall of stone, sometimes over-hanging, or by the current cut in rounded buttresses and alcoves. The upper strata here consist of flaggy limestone in thin layers, filled with partings of chert from one to four inches thick, while on an adjoining farm the same bed is sufficiently pure and has been burned for lime. A thin stratum corresponds to the "fire stone" found at Logansport, which on exposure to the weather shows a peculiar greenish tint, perhaps due to the presence of silicate of lime. In partings between the thick flags were seen fossils of the following genera: *Zygospira*, *Orthoceras*, *Cyrtoceras*, *Trochoceras*, *Pentamerus* and *Athyris*.

The following section was taken on Davis' farm, half a mile above the lower dam at Somerset, viz.:

#### SECTION ON DAVIS' FARM NEAR SOMERSET.

Soil.....	1 to 4 ft.
Flaggy limestone.....	10 to 5 ft.

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Heavy bedded sandstone.....	4 ft.
Clay parting.....	2 to 1 ft.
Argillaceous (hydraulic) sandstone.....	16 ft.
Blue bands and concretions highly argillaceous, to river.....	10 ft.
	<hr/> 40 ft.

On the farm of A. S. & W. Ross, half a mile west from Somerset, is a deposit of ferruginous earth (formerly bog iron ore) apparently from two to three feet thick, and covering an area of four acres. It is a tolerably pure oxide of iron. Roasted and ground as it is, or mixed with clays to vary the color, this earth might be utilized to manufacture the ochreous paints so universally used. The spring by which this mineral was placed here, flows out ten feet below, still highly charged with iron in solution, and may justify attention for medicinal purposes.

Good quarry stone is found for several miles, descending the Missisnewa, some of which has been hauled by wagons to Grant county, for the public buildings at Marion.

In generalizing we can say that, besides a fertile soil and a generous supply of water power, nature has endowed Wabash county with a boundless wealth of superior flag stones, good common stone, and an unlimited deposit of cement which needs only persistent effort to make it available.

## HOWARD COUNTY.

Howard adjoins Miami county on the south. The surface is level, with scarcely perceptible undulation, and presents characteristically the undisturbed level of the bowlder drift. The soil was originally a rich black muck, since changed by drainage and sunshine into a light loam of great fertility. Good houses, substantial improvements, and well filled barns indicate satisfactory crops and a prosperous and energetic people.

Timber of the best quality is abundant, almost a drug,

for the supply is greater than the demand, and much is wastefully destroyed to make room for more remunerative cereal productions. The annual shipment of lumber from the county amounts to more than 10,000,000 feet. Of this, 6,000,000 feet is black walnut boards, bringing forty dollars per 1,000 feet. The balance comprises ash, oak and poplar lumber.

From the level character of the surface and the spongy nature of the soil, indifferent, if not impassable roads was one of the hardships with which the pioneer had to struggle; since, gravel and stoned roads have been built east, west and south from Kokomo. Gravel beds of small extent are found along the low bluffs of Wild Cat creek, and the flaggy limestones found at Kokomo are largely used for macadamizing, with the best results.

The rock exposures seen at Kokomo reach from the base of the Devonian black slate, down to and including a thin stratum containing silurian fossils, the principal exposures being Devonian. A well bored near the county seat gives the following section, and shows the hydraulic beds noted in Wabash county, well developed beneath the surface here:

#### BORE AT KOKOMO.

Soil .....	5 ft.	0 in.
Hard limestone, Devonian.....	50 ft.	0 in.
Gray limestone.....	30 ft.	0 in.
White silicious limestone, (here a strong current of water).....	50 ft.	0 in.
Blue mudstones, hydraulic limestone and clay shales.....	690 ft.	0 in.
		<hr/>
		825 ft. 0 in.

Small quantities of petroleum came up with the sand pump at several points in this well, and there was a considerable discharge of gas.

This well was closed with earth. The detritus brought up by boring, after exposure to the weather for six years,



indicated a large preponderance of aluminous material passed by the auger in boring.

On the farm of G. F. Gleeson, four miles southwest from town, is an interesting gas well, in the drift clay, which probably terminates at or near a stratum of Delphi black slate (Genessee slate).

#### GLEESON'S WELL.

Soil.....	2 ft.
Yellow clay.....	14 ft.
Sand and gravel.....	3 ft.
Blue clay, boulder drift.....	36 ft.
	—
	55 ft.

At the bottom of this well a strong flow of water was found, which rose in the well to within six feet of the surface. With it comes a considerable discharge of carburetted gas, which continuously bubbles up through the water. It burns with a bright, clear blaze. Mr. Gleeson proposes to use this gas for household, culinary, and illuminating purposes, for which there is believed to be an abundance. The water has a slight infusion of petroleum. A number of chalybeate springs, on the same farm, are not affected by drouth, and also discharge illuminating gas. Notwithstanding these "signs of oil," I can say, after a careful examination of the oil bearing rocks on a long range above and below this horizon, that the probabilities against a paying oil well are great.

Near the fair grounds, two miles southwest from Kokomo, the Wild Cat runs over a solid floor of rock. In the channel are seen successive concretions derived by erosion from the lower member of the black slate noted in Carroll, Jasper, and White counties. On the north bank is a wonderful spring, welling up from a fissure in the solid rock, which pierces to an unknown but great depth below. The supply of water is not varied by drouth or wet weather. Gas bubbles up with the water, and a small quantity of petroleum may be detected. A shaly stone at the water's edge

is saturated with petroleum, and burns with a flame equal to the best Cannel coal. A good bed of gravel, just below the fair ground, was visited. Here choice material for making roads is found in abundance, and is used by the city and gravel road authorities.

Near the road leading to town, A. Bernard burns a flaggy limestone, for the local market. Lime of good quality is produced. At the city quarry and at Detenbough's, stone is quarried for lime burning, foundations, and road-making. At the latter, a good article of lime is produced in quantities, and a shale bed near the west line is so completely saturated with petroleum, as to invite experiments with it as an engine fuel.

#### SECTION AT DETENBOUGH'S.

Soil with debris, from the black (Genessee) slate.....	10 to 2 ft. 0 in.
Rough limestone with an obscure <i>Orthoceras</i> , <i>Chonetes setigera</i> , <i>Productus subalatus</i> , <i>Lucina</i> <i>proavia</i> , <i>Spirifer</i> , <i>Athyris</i> , and <i>Hemipronites</i> ?.....	2 ft. 6 in.
Flaggy limestone with bands and partings of chert, but some- times pure.....	5 ft. 0 in.
Slate saturated with and bedded in petroleum.....	1 ft. 6 in.
Silico-calcareous rock : some thick bedded .....	8 ft. 0 in.
	<hr/> 19 ft. 0 in.

The minerals of Howard county are not extensive. Enterprise has made a good use of nature's offering. Thankfully an energetic people have utilized these, their beds of gravel and stone, and may proudly boast that, in spite of nature's miserly gifts, they have built longer and better roads, than their neighbors who are more favorably situated.

Kokomo, the county seat, is situated at the intersection of the railways traversing the county, and is the terminus of five gravel roads. As a consequence, this young city presents a prosperous air of thrift. The court house is a handsome and costly structure. Howard College edifice is fully up with the times, while substantial and comfortable private buildings are common.

THANKS.

In conclusion, acknowledgements are due to the following gentlemen for information and guidance :

R. S. Dwiggin, Wm. Thompson, and the editorial fraternity at Rensselaer ; Father Stephens, at San Pierre ; Dr. Bushnell, at Monticello ; Dr. Beck, Cartwright & Co., Hubbard & Co., and others, at Delphi ; Wm. Miller, Maj. Dunn, D. Keepert, W. Wright, Dr. Bringham and S. J. Penrose, Logansport ; E. H. Shirk, G. L. Dart and J. T. Hinton, Peru ; A. P. Ferry, J. Mackey, Dr. Ford and S. Fisher, Wabash ; A. B. Walker, T. C. Phillips and A. F. Armstrong, Kokomo.



Thomas Nelson, James H. Rogers and William Jarvis, Commissioners of Parke county, at their March term, 1872, ordered the necessary appropriation from the County Treasury to effect a geological survey of the county under the direction of the State Geologist. Professor B. C. Hobbs, LL. D., was chosen his Assistant for that work and the following is his detailed report with accompanying map:

PROFESSOR E. T. COX:

*State Geologist:*

I herewith submit my report of Geological Survey of Parke County:

Some matters of general interest, not strictly geological, have been introduced as desirable information for the general reader and are, therefore, within the instructions of the Statute.

With thanks for many kind favors,

I am, with regard, truly,

B. C. HOBBS.

Bloomington, Ind., Dec. 15, 1872.



# REPORT OF GEOLOGICAL SURVEY OF PARKE COUNTY.

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BY PROF. B. C. HOBBS, LL. D.

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## TOPOGRAPHY.

Parke county is bounded on the north by Fountain county, on the east by Montgomery and Putnam; on the south by Clay and Vigo, and on the west by the Wabash River, which separates it from Vermillion county.

It embraces the townships 14, 15, 16 and 17 north, and ranges 6, 7 and 8, and the eastern sections of range 9.

Rockville, the county seat, is in latitude 39 degrees and 40 minutes, and it is about 10 degrees west longitude from Washington City. The county contains an area of about 480 square miles.

Its general drainage is to the southwest. The Wabash, along its western margin, receives an unusual amount of tributaries from this county. But few counties in the State are as well watered. Its principal streams are the Big and the Little Raccoon, Sugar creek, Wabash and Mill creek, and Coal creek enters it in the extreme northwest. These streams all flow into the Wabash. The tributaries of Big Raccoon are chiefly from the north, and are Leatherwood, Rock run, Little Raccoon and Green creek. Little Raccoon receives Williams and Sand creek. Sugar creek

receives Rush creek, Roaring creek and Sugar Mill creek. The latter receives Green creek.

The Wabash has cut its channel down through the surface strata about two hundred and fifty feet, and its tributaries afford the geologist in many places, especially where the sand stone is not friable by exposure to the weather, an excellent opportunity to discover the thickness and character of its coal, clay and stone. The upper Big Raccoon, Sugar creek, Roaring creek and Sugar Mill creek wind in many places through deep gorges, and their banks afford the lover of nature much pleasure and admiration by their bold and massive cliffs and romantic rock houses. Turkey run, the Pinnacle, the Devil's Den, etc., are highly attractive places. When these wild and beautiful streams are made accessible by railroads, they will be found in many respects superior to any other rural scenery in the State.

The streams of Parke county generally widen their valleys as they approach their confluence. The Big and the Little Raccoon have for many miles a valley breadth of near one mile. Their valleys contain precipitated alluvium from the rich soils of the table lands, and are unsurpassed in fertility. The Wabash valley in like manner extends from one to two miles eastward. The forests have, to a great extent, been removed from these "*river bottoms*," and they are annually covered by contiguous maize fields, which often present an unbroken continuity of waving grain for miles on either side.

The surface of the table lands of the county are generally gently undulating. There are but few *sloughs* or *ponds*, and but a comparatively small portion of the county so precipitous that it can not be cultivated.

## GEOLOGY.

### CENOZOIC GEOLOGY.

The carboniferous strata of Parke county are covered by drift. This drift generally consists of red clay, sand and



gravel as a surface deposit. The red clay often gives place to a dark carbonized soil analagous to that of the upland prairie. In the flat beech land it is generally a pale tenacious clay, well adapted to grass and but little inferior in utility, with proper cultivation, to the river bottoms for corn and it is superior for wheat. These clays are so well combined with sand that the soils of Parke county easily pulverize and are every way desirable for cultivation. In many places, sand and gravel deposits are found showing that the rush of waters that brought them was not uniform in its movements nor in its deposits. These sands and gravel banks are interstratified. Coarse gravel, coarse sand and fine sand give place to each other often without regard to any law of superposition, and often sand deposits show ripple marks giving evidence of a lake which moved its sands by waves as well as currents.

The sand and gravel banks are most abundant along and in the bluffs and valleys near the Wabash, but are often found throughout the county.

A sandy soil prevails along and between the two Raccons from Bridgton to Rosedale and along the southwest border of the county. Deep sandy ridges and valleys prevail in the northwest part of the county between Sugar creek and Cole creek. The indications favor the presumption that the movements of the waters depositing the drift varied in direction and velocity, and that the material was brought at different periods and from localities remote from each other.

Under this surface drift is a deposit of blue clay which is general throughout the county, except where cut through by river channels. This blue clay is from three or four to forty feet thick or more. When wells are dug through it, unless walled, it will cave in, in rectangular prism shaped blocks.

The waters which brought the blue clay from whatever country must have had something to do with the glacial action which cut or crushed a way through the coal and sandstone deposits, since it contains almost every variety of

material. Wood, sandstone, limestone and granite pebbles, gravel and sand of various degrees of fineness, broken fragments of coal, everything remote or near has been gathered up and borne along in the general movement of the waters or ice flow by which it was deposited.

A stratum of sand or gravel is generally found under the blue clay. When wells are dug down to it, an abundance of good, unfailing water is usually found, which will rise several feet above the bottom of the well.

Large pieces of timber are often found buried deeply in these clays; and I am reliably informed that in the north-east part of the county a well digger found what appeared to be the corner of a building. The timbers found bear strong resemblance to the fiber of the cedar and pine. In a few places mastodon teeth and fragments of bones and tusks have been found. No doubt if the pioneer citizens of the county were organized into an antiquarian association, many objects and facts of interest could be gleaned from them which would be of material value to the scientist, the geologist, and the antiquarian.

There are other topics intimately associated with this department of my Report which I prefer to include in what I may say on Soils and Timbers.

#### PALEOZOIC GEOLOGY.

The stratified rocks of Parke county belong to Paleozoic time. It exposes almost, if not fully, a complete series of the regularly recognized coal seams found in the State. Many of these seams exist only in the southwest part of the county, in the highlands of Wabash and Florida townships. Four, if not five, coal seams crop out west of Rockville, Catlin, and Rosedale.

The following exhibit is made out from an exposure in a valley entering the Big Raccoon at Mecca, on land owned by Lowry and Batman, which affords bold, nude walls nearly all the way from its first depression from the table lands to the river bank, and cutting the strata to a depth of about one hundred and fifty feet. East of Rock-

ville the thickness and succession of the stratification is inferential, no positive data being at command to determine it. It is taken from exposures north and south of a line east of Rockville. The strata west of Rockville can be pretty accurately determined by the exposures on Big Raccoon, Leatherwood, and Rock Run or Iron Creek :

GENERAL SECTION OF THE ROCKS IN THE MIDDLE OF  
PARKE COUNTY

Made from outcrops along the line running east and west through Rockville from the Wabash river to Putnam county, commencing with the surface drift, in a ravine near Mecca, which cuts through the strata to a depth of near 150 feet, and in which the rocks are well exposed. This exposure is on land owned by Lowry and Batman, in sections 14 and 15, township 15, range 8 :

- |   |            |
|---|------------|
| No. 1. DRIFT—Red clay, blue clay and gravel 30 to 60 ft.  |            |
| No. 2. COAL—Opened, not worked. The roof is not determined. The cropping indicates good coal.....   | 4 ft.      |
| No. 3 SANDSTONE—Massive, excellent quality<br>The Clinton Iron Furnaces were made of it.<br>The best stone in the piers of the canal aqueduct at Armiesburg were obtained here.<br>It resists well the action of both fire and weather. Its color is cream-yellow or a flea-bitten fawn skin. Portions of it are a rich brown. It quarries to any desirable size and shape..... | 40 ft.     |
| No. 4. BLUE CLAY—With nodules of iron ore.<br>The ore is not abundant.....  | 15 ft.     |
| No. 5. COAL—A double seam. Each stratum 1 foot, separated by a stratum of blue clay of from one to six inches.....  | 2 ft.      |
| No. 6. FIRE CLAY—With kidney iron ore.<br>Ore under as well as through it.....  | 4 ft.      |
| No. 7. GRAY SANDSTONE.....  | 2 to 3 ft. |

No. 8. BLUE CLAY—With a small quantity of kidney ore.....	20 ft.
No. 9. COAL—Good, bituminous.....	3 ft.
No. 10. FIRE CLAY.....	3 ft.
No. 11. SANDSTONE—A good building stone. Gray, yellow and brown with specks of oxide of iron.....	4 ft.
No. 12. BITUMINOUS SHALE.—With thin seams of coal.....	4 ft.
No. 13. SANDSTONE—Blue and gray and in thin strata.....	2 ft.
No. 14. BLUE CLAY—With iron ore more abundant than in seams above.....	5 ft.
No. 15. LIMESTONE—In layers from three to eight inches.....	2 ft.
No. 16. COAL—Associated with this seam are irregular shaped sextaria nodules of pyritous iron ore, generally small, but here four to five feet long, and two to three feet across. This coal indicates identity with the cropping at Armiesburg bridge. Inferior quality. I take it to be identical with the seam at Woodward's and Butler's mines, and at R. Outland's or Leatherwood. At each of these places it affords a superior, rich, bituminous coal much prized by smiths.....	2 to 4 ft.
No. 17. SANDSTONE—Underlaid by a ferruginous claystone and in places runs into fire clay	8 to 15 ft.
No. 18. COAL—Rich, bituminous. Often contains too much sulphur. It shows above low water mark at the bridge at Armiesburg. I take it, and the seam above, to be identical with coal at Clinton Locks, and at Steele's mines, at Rosedale and at Roseville, in "the general section of the coals" given by Professor Cox in his report for 1870, marked L....	4 to 6 ft.
No. 19. BLUE CLAY—Thickness not known...	20 to 25 ft.

No. 20. BLACK LIMESTONE—Sand creek, upper seam K.....	4 ft.
No. 21. COAL—Semi-block.....	4 ft.
No. 22. SHALE.....	25 ft.
No. 23. BLOCK COAL—Crops out below K at Sand creek, and is mined by Nye & Co. I, or main block.....	3 ft.
No. 24. FIRE CLAY.....	10 ft.
No. 25. SOAPSTONE.....	6 ft.
No. 26. SANDSTONE—Yellow.....	20 ft.
No. 27. BLUE SANDSTONE.....	2 ft.
No. 28. GRAY SANDSTONE.....	5 ft.
No. 29. SANDSTONE—Massive, millstone grit. At Mansfield it is a beautiful reddish-brown.	40 ft.
No. 30. DARK SHALE.....	6 ft.
No. 31. COAL.....	1 ft.
No. 32. FIRE CLAY.....	0 ft.
No. 33. FERRUGINOUS LIMESTONE—On Big Raccoon.....	? ft.
No. 34. LIMESTONE—Subcarboniferous. This formation extends eastward through Putnam county .....	.....

The last ten strata are inferential, being taken in part from borings in different localities.

There is much variation in the thickness and character of the rocks in different places. The section here presented will, however, afford a general idea of the successive deposits which make up the surface material of the county to a depth of perhaps 250 feet measured from the table land east of the Wabash river. Eight seams of coal, most of which are workable, measuring in the aggregate more than 20 feet, here lie buried, waiting for the miner.

#### GENERAL OBSERVATIONS UPON THE COAL, IRON ORE AND SANDSTONE IN THE PORTIONS OF THE COUNTY EXAMINED.

I commenced my reconnoissance in Florida township, at

Clinton Locks. Three coal seams crop out at this place, which I take to be N, L and I of Prof. Cox's corrected section of coal measures, page 168, Report of 1870.

The upper and middle seams were worked many years ago when the Wabash and Erie canal afforded transportation. Much of the supply of Terre Haute and above was from this place. The upper seam measures four feet; the middle one five feet. The lower seam has recently been found in the bed of a stream on the land owned by J. M. Wilson. The upper and middle are separated by about twenty-five feet of bituminous clay slate, and the middle and lower by about twenty feet of shale. The middle vein has afforded the main source of supply. Since the canal has ceased to afford transportation, but little mining has been done here. It is a rich caking coal, but has too much sulphur for smelting purposes.

The lower seam had not been mined sufficiently to determine its thickness. It indicated a good block coal.

These veins dip to the east at the rate of forty feet to the mile, and to the north at the rate of twenty feet, showing a reverse order to the ordinary dip, which is about twenty degrees south of west, and at an average of about twenty feet to the mile.

The table land above is about seventy-five feet above the general level west of the Wabash, as ascertained by observations of J. T. Campbell, former county surveyor, who happened to be engaged in a survey of that locality about the time of my visit.

The bed of the middle coal seam is about five feet below the level of Montezuma, as shown by a railroad survey running near it. The outcrops were not sufficiently clear to enable me to ascertain the greatest depression of the seam northward. It evidently rises and reappears at Butler's mines, near the mouth of Leatherwood, and at Mecca, in Wabash township.

#### MECCA AND RACCOON VALLEY.

Crossing the ridge to Mecca in Raccoon valley, I found

the interesting exhibit of the first seventeen strata, presented in "The General Section of the Rocks in the Middle of Parke county."

This ravine affords an interesting variety of material both for the miner and the scientist. Seam number 3 is represented by forty feet of sandstone. It shows but ten or fifteen feet here, but half a mile south it is about forty feet thick and a very superior building stone. It can be quarried to a desirable size and shape and will yield well to the hammer and chisel.

In many places down this valley kidney iron ore is abundant, and several coal seams may be advantageously worked. The home demand has hitherto been so small on account of its inaccessibility, that but little mining has been done.

Corresponding coal seams and sandstone appear on the west side of the Raccoon on the lands of William Hixon, and at other points in that vicinity.

Ascending the Raccoon valley half a mile south of Mecca, I found kidney ore abundant and much of it sufficiently rich to invite the attention of iron manufacturers. Coal is occasionally seen cropping out in the ravines, but the exposures were not such as to enable me to determine their thickness, roofing or quality. For several miles above Mecca there are no bold projecting cliffs along the stream until we reach the vicinity of Roseville.

In section 5, on lands owned by Allen Lewis and John W. Mark, two veins of coal appear, each about three feet, also an excellent quality of yellow sandstone. The railroad which will soon be completed from Carbon to Chicago via Danville, Ill., will offer an incentive to the owners to develop it more fully. These coals I take to be L and M, and correspond with those at Roseville and Rosedale.

About one mile northwest of Roseville the same two veins are found on land owned by W. Evans and G. W. Bement. The lower seam is five feet six inches. I was unable to procure fair samples of it, but it is represented to be a good coal, burning to a brown ash with but little clinker. The

earth had caved in upon the mine when I visited it, so that I was unable to inspect it.

I consider this lower seam identical with the coal east of Catlin, at Beal's mines, and marked I. It crops out at the water's edge at Roseville. It will probably be a good block coal, from indications where opened, and from its thickness ( $4\frac{1}{2}$  feet) will no doubt prove of much value when the railroad down the Raccoon valley is completed.

At Roseville is a fine exhibition of carboniferous sandstone, or millstone grit.

At Roseville is a fine exposure of carboniferous or conglomerate sandstone. It has the appearance of a ridge of stone, which in the carboniferous period extended above the waters in which the coal plants grew, and on either side of it the coal and shale seams are fitted to its sides without a variation in their level. North of the stream it presents a bold, rugged cliff, from which has been taken much valuable building stone. On its crest is a beautifully white, friable sandstone, which finds its way to Terre Haute and Indianapolis for the manufacture of glass. Portions of it are damaged by peroxide of iron, which changes it into a rich red color, and destroys its market value for glass. I shall not be surprised to hear of this stone being sought by Chicago and Indianapolis. It is a soft stone and readily quarried, but hardens on exposure, and is every way desirable as a superior building material.

The Big Raccoon, a mile or two above this place, has evidently once in a time had a channel by Rosedale southward, down a wet, low prairie which passes east of Terre Haute and enters the Wabash some miles below the city. By one of those wonderful disturbances among the rocks, for which our earth has been remarkable, a channel has been opened for it northward to Armiesburg, across a high ridge composed of stratified rocks, where it enters the Wabash about twenty miles above its former confluence.

Perhaps about the same time, and while great changes were going on in Parke county, for nature's dynamic forces have distorted and disturbed it much, especially in Florida,



Wabash, Reserve, and Penn townships, Leatherwood, which evidently once ran from Bloomingdale across through the present valley of Rock Run, found a new channel opened for it through the highlands west of Joel Reynold's place, across the lands now owned by J. Parker, H. Little, P. Pearson, and P. Mitchell, and it re-unites with the Rocky Run valley near its intersection with the plank road leading from Rockville to Montezuma. The old bed of Raccoon is now occupied by the Terre Haute and Crawfordsville Railroad, and its present valley has invited a branch of the Chicago, Danville and Vincennes road through it in quest of the block coals in southern Parke and Clay counties.

Coal I, described above, passed out of view under the stream above Roseville, and K and L crop out along the hillside above to Rosedale, where Gen. G. K. Steele has had entrances which have yielded a large supply for market by the Evansville and Crawfordsville Railroad. The seam here works about five feet, but is not sufficiently free from sulphur to be desirable for smelting ores. It is a good coal for steam and grates, and corresponds to the coal at Clinton Lock. It has not, however, been convenient for him to continue his mining operations for the past two years, and when I visited the place no coal could be seen which would indicate its character. These seams show very favorably above Roseville, where they have been successfully mined for many years.

Opposite Roseville, above and below the ridge of millstone grit, or conglomerate sandstone above described. The same coal makes a good showing on the lands of Evans and Hawkins. The demand has not hitherto been sufficiently great to develop its qualities. When avenues to the markets are opened, there will be found sleeping in these hills material wealth that will reward the industry of many generations.

Adjacent to this coal is a superior massive sandstone. It is of a cream yellow and brown color. It yields well to the hammer and chisel, and can be readily procured of any desirable dimensions. It extends for some distance up the

valley of Rock Run, making majestic, overhanging moss-covered cliffs. I shall not be surprised to see, some day, a switch from the Raccoon Valley Railroad span that stream to reach this waiting and inexhaustible supply of building stone.

Passing up the valley of Rock Run about two miles, these rugged, romantic, precipitous banks, begin to mellow into soil covered hills, and at section 3, township 14, range 8, on the lands owned by Daniels and Bailey, the seams L and K again make their appearance, rising as we go northward more rapidly than the stream. Its roofing is a silicious and clayey, and in many places ferruginous limestone, bearing marks of identity with the coal on S. Woodard's place in Rock Run valley, and at Butler's mines.

Kidney iron ore is very abundant along this valley. It would afford a good supply for admixture with the Superior ore.

A seam of fire clay about eight or ten feet thick separates the two coal seams. The upper coal is about two feet thick and the lower, as nearly as I could ascertain, is about four feet.

Two miles north, in Wabash township, on H. H. Anderson's land, section 27, township 15, range 8, the upper seam measures twenty inches, and the lower seam is in the bottom of the stream and the thickness is not ascertained. It is considered very desirable by smiths who have used it. In section 14, I found a very abundant supply of iron ore imbedded in blue clay. The stratum is about thirty feet thick. The ore is not so rich as abundant. It would not probably pay to work alone. Leaving this point we find but few exposures that would attract attention until we reach the table lands.

#### RACCOON TOWNSHIP.

Crossing Little Raccoon near its mouth and passing up the north side of Big Raccoon, a more delightful valley is rarely seen. A rich, gently undulating, sandy soil fills the space between these rivers for some two or three miles, when

hills and stratified rocks are found on the left and a continuous expanse of valley extends to Mansfield. Its breadth is generally about one mile.

In sections 29 and 30, there are croppings of coal but little attention has been given them. In section 7, on Jackman's land, two seams appear. The upper one has a roofing of carboniferous limestone containing *Encrinite* stems, *Bellerophon carbonarius*, *Chonetes mesoloba*, *Athyris*, etc., corresponding with the coal on S. R. Beal's land, on the south side of Little Raccoon.

The upper seam is about four feet thick and yields an excellent coal. It is bituminous but a semi-block. It may be found to answer for smelting purposes.

Under this are strata of fire clay and shale, at the base of which is a stratum of encrinite limestone and a second seam of coal underlying it in bed of stream, the thickness of which was not determined. This locality is very inviting to the miner and manufacturer, and when approached by the North and South Railroad will yield a good and satisfactory supply for market.

In the branch, about half a mile northwest, is found a very interesting exhibition of Amygdaloid or Trappe formation of iron ore. It consists of horizontal strata of cubical, wedge shaped, and quadrilateral prism shaped blocks and bars of ore, generally about one inch in diameter. Some of these bars are a foot long. The bottom of the branch is spanned by this stratum of ore.

In sections 3, 4, 5 and 8, on both sides of the Little Raccoon, on land owned by Samuel R. Beal, Calvin Gilkerson and others, there is an abundant show of excellent coal. It varies in thickness from four to five feet six inches. The N. & S. Railroad survey passes through this region. Two veins, I and K, are found, evidently corresponding to Jackman's and Sand creek coals. They have been but little mined south of Raccoon, on account of the small demand near by and the difficulty of reaching the market. Along the railroad survey, passing over the hill towards Bridgton, the same seams are found, promising a good yield on the

north side of Big Raccoon. In these several localities, a good article of kidney iron ore is found in varied abundance, with copious deposits of fire clay.

In sections 34, 35 and 36, in the southeast part of the county, coal I, a good block coal, is mined. Much of these lands is owned or leased by companies for mining purposes. The N. & S. Railroad survey passes through this locality. The coal seen is mined in beds of streams or along their banks, and are covered with drift. Their proper roofing is not discoverable; their thickness is about four feet. A "lead mine" legend is remembered with interest in this vicinity. The Indians, in an early day, are said to have found an abundant supply of lead on or near section 36, which they melted and ran into bullets. They kept the locality a profound secret. The penalty for showing it to the white man, was cutting out the tongue. When they were preparing to leave for the far west, much importunity was used and rewards offered for its discovery, but in vain; they claimed that the Great Spirit gave it to the Indian and increased the supply as fast as he used it, and if he let the white man have it he would use it all up and the Great Spirit would not furnish a supply for *him*. There has been much searching for the hidden treasure, but no one has been able to find it.

#### JACKSON TOWNSHIP.

There are few favorable exposures of coal in this township. The southwest corner comes within the general coal field, and in section 32, I am told, a five feet seam of coal is found. I was unable to reach it. A good showing of coal was discovered on Clear creek, in section 22, on the land of J. N. Bell, which, when worked, may be found desirable. On Mr. Peech's place, in section 14, is found an eleven-feet seam of rich bituminous shale, which, when worked sufficiently deep, assumes a solid, compact form and breaks with a cannel coal fracture. It burns well, but leaves a slaty ash. It has been mined in the bottom of the stream, but at the time of my visit none but weathered specimens could be seen.

In this vicinity may also be found fire clay of fine texture resembling "slip clay." I understand its qualities have not been fully tested. A good showing of fire clay is also found half a mile north, on Bullion's land. A similar showing is found on the farm of Calvin Pruitt, in section 4.

No doubt, by boring and surface examination, good coal seams may yet be found in the western part of this county.

The limestone makes its appearance in the bottom of Big Raccoon, just above where it crosses the line between Jackson and Union townships. Near this locality, in Union township, in section 33, a ten-inch seam of coal is found under a dark shale. From its locality, I infer that it is the lowest of the coal seams of the county.

Iron ore is abundant in many localities in this township, especially on Clear creek.

By far the most desirable mineral in this township is its sandstone. In the vicinity of Mansfield is found in very great abundance a beautiful massive, solid, durable, brownish-red sandstone. It can be quarried in blocks of any desirable size or thickness. It is of a uniform color, and dresses to a good finish. I think it has no superior.

This township is generally hilly and the banks of many streams are continuous walls of carboniferous or conglomerate sandstone. It is most generally a yellowish-brown. It assumes all kinds of fantastic faces—cliffs, "rock houses," honey comb and barnacle surface, and very generally an antique moss-covered exposure, showing how perfectly it can resist alike the decomposing power of frost and air. This township would afford ample business for a railroad to Indianapolis or Chicago in the transportation of its superior and inexhaustible building material. I shall speak of its superior timber in another place.

#### UNION TOWNSHIP.

But little coal is found in this township. I have mentioned a ten-inch seam in section 32, under a dark bituminous shale. The same coal appears in section 22, on J.

Martin's place. A seam is also found in section 27. The thickness I could not learn. The same nine-inch seam crops out in a branch, half a mile south of Hollandsburg, on J. O. Stout's land, but 25 or 30 feet under it is a fine display of limestone in the bottom of the branch. In section 3, on S. Burke's place, about two and a half miles north of the latter place, is a very fine cropping of a three-foot seam of good block coal. Limestone, about 15 or 20 feet, under it, is in bottom of the branch. The same seam shows equally well half a mile north, on Carver's place.

About half a mile south of Bellmore is a fine display of iron ore, on Miller's place. All the way up Raccoon valley, massive, yellow, conglomerate sandstone is seen, and limestone is usually present in the bottoms of the valleys. These limestone exposures correspond with the Putnam county formation, and assure us that we here reach the downward limit of the coal deposits.

#### ADAMS TOWNSHIP.

In section 25 and 26, on J. Beard's and J. Neven's land, is found a very good coal. I was unable to reach it. Its qualities were spoken of in very high terms by different and disinterested gentlemen. As nearly as I could learn, these coals measure about three feet. In sections 32 and 33 are found Beal's mines, north of Little Raccoon, and marked I upon the map. This coal measures about five feet. The North and South Railroad passes over it. It was not worked when I visited it. It is under the drift, and but a few feet below the surface in the Raccoon bottoms. An old entrance had been abandoned, and a new one more convenient commenced. When the North and South Railroad shall be finished, I expect an active business will be conducted in this locality in mining and in iron manufacture, lying as it does contiguous to an unfailing supply of water in Little Raccoon.

As we advance up Williams creek, along the line of the North and South Railroad to Rockville, iron and coal ore

are frequently exposed. A. Pickard is just opening an excellent seam in section 17. The same seam has furnished Rockville for some time past with a good article of semi-block coal from Walker's place, one mile above. The latter has too much sulphur for smelting purposes, but answers well for grates and steam. It is marked K upon the map, and I take it to be the upper seam of Sand creek. It is mined in a branch, and I was unable to ascertain the character of its roofing. It measures about four feet. About half a mile east of Rockville, it is found in the bed of Williams creek, and again in section 5. In sections 26 and 35 this coal is found on Beard's land. The sample shown me was very superior. I have no doubt but that it underlies the entire township. Wood is too abundant to warrant the expense of mining by a shaft, and the miner must wait until some avenue can be had to bear it to a distant market.

In Little Raccoon valley, east of Rockville, is found a very superior quarry of carboniferous sandstone. It quarries into any desirable blocks. It has a very sharp grit, and is excellent for grindstones. In some places it is beautifully white, in others red, brown and yellow. It resists the action of frost and air well, and is a very desirable building stone.

#### WASHINGTON TOWNSHIP.

I shall only speak here of that portion of the township which is drained by Little Raccoon. In sections 34, 33, 27 28 and 21, along the valley of Sand creek, are found two coal seams, marked on the map K and I. The upper is roofed by a carboniferous limestone. Under it is fire clay and shale, and about twenty-five feet under it is a three-foot seam of block coal. The seam K is variable in quality. It generally yields a superior bituminous semi-block, but in some places it has too much sulphur for smelting purposes. The block coal seam has not yet been mined sufficiently to test its qualities. It bids fair, however, to take a favorable place in the market. Very extensive operations are here

conducted by Nye & Company, and the Parke County Coal Company, by means of the transportation offered by the Logansport, Crawfordsville and Southwestern Railroad. A large number of mines are worked for neighborhood supply, in croppings along the hillsides. An analysis of these coals will appear elsewhere in a tabulated form.

In sections 14, 23 and 24, northwest of Judson Station on the Logansport, Crawfordsville and Southwestern Railroad, is a continuation of the Sand creek coal seams. Their palaeontological characters are the same. They are here accompanied by an abundance of good kidney iron ore on the lands of A. Buchanan, Esq., where also is found an interesting display of band ore. The upper seam measures about five feet, and is pronounced by Professor Foster, of Chicago, the richest ore in the Indiana coal fields. (See table of Analysis.) It lies there waiting for a switch and the miner. Excellent sandstone is found in the hills in this locality. It is generally gray and yellow. I found here some interesting specimens of *Sigillaria*. Limestone makes its appearance in the bottom of Raccoon, a little below Judson.

#### GREEN TOWNSHIP.

Coal makes its appearance in the southwest part of this township, in section 31, on lands owned by J. Marks. It is a very flattering outcrop of a five-foot seam of block coal. In a valley half a mile south, two seams are found; the upper about three feet, and the lower two feet. One of the surveys of the Indiana and Illinois Central Railroad passes over these coals. Timber is so abundant, and the demand so light from lack of transportation, that no important attention has been given to it. Immense treasures are here silently sleeping, where a busy population will one day be found, and forge fires will probably send up their flames for many future generations.

I have already noticed J. Carver's coal in section 34. An outcrop of a twenty-inch coal appears also on J. Strong's place in section 19, and two miles north, on D.



Burris' land, which is mined in a stream by removing the soil cover. It does not promise well either for thickness or quality.

A good brown and bright red sandstone is found on J. Strong's land, in section 17, which has been worked considerably the past summer to supply a demand in Clinton county. It does not, so far as tested, show enough uniformity of color to make it very desirable as a building stone. It answers well for foundations. Limestone is found in the northeast portion of this township, showing that we have passed below the coal seams. A good quality of lime is made from this stone. Carboniferous sandstone is found abundant in the bluffs along the streams generally through the township.

Reserve, Penn, Liberty, Sugar Creek and Howard townships not being conformable to the Congressional townships and very irregular in their boundaries, I can complete the description of my reconnoissance best by ascending the streams, rather than by townships.

Leatherwood enters the Big Raccoon one mile above Armiesburg. Just above its confluence, section 7, township 15, range 8, are found five coal seams four of which have been worked. The upper one, M, corresponds with the upper seam at S. Woodard's mines in section 4, and measures twenty inches. It is separated from the seam below by a space of eight feet—three feet of fire clay, four of a greenish argillaceous shale underlaid by a black pyritiferous slate containing fish teeth, *Petrodus occidentalis*, spines and scales, *Cardinia fragilis* and *Aviculopecten rectilateraria*. The second seam which is now most worked is four and a half feet and is marked on the map, L. It yields a good caking coal and an eighteen-inch stratum of block coal. It corresponds to the main seam at Rosedale and Roseville. It also contains bands of iron pyrites and a pyritiferous clay parting. The third seam, K, measures about four and a half feet, and corresponds to the upper seam at Jackman's mines in Raccoon township. Under this seam is a five feet stratum of fire clay, four feet

of argillaceous shales, a soft schistose sandstone ten feet, shales twenty-one feet. Under this is the fourth coal seam overlaid by a thin seam of black slate. It measures about eight inches. It is underlaid by

“Gray shale..... 8 ft. 0 in.

Black sheety slate, with fossil shells  
of which *Cardinia fragilis*, *Ortho-*  
*ceras Rushensis*, can be recognized 3 ft. 0 in.

Coal..... 0 ft. 6 in.

Gray shale..... 8 ft. 0 in.

Black pyritiferous shale, passing into  
hard gray fossiliferous limestone,  
containing *Productus cora*, *P. Cos-*  
*tatus*, *P. Wabashensis*, *Spirifer cam-*  
*eratus*, *Bellerophon carbonarius*,  
*B. Montfortianus*, *Cyathaxonia pro-*  
*lifera*, *Orthoceras Rushensis*, *Cho-*  
*netes mesoloba*, and large stems of  
Crinoids” ..... 18 in.

(See Prof. Cox's Report for 1869.)

This black pyritiferous shale is often suspected to be plumbago. It will mark paper well, and can be readily cut into pencils, but will burn easily, leaving a slaty ash. This seam is but a few inches above the surface of Leatherwood.

During the past year, about forty thousand bushels of coal have been taken from these coal seams to supply the demand in Montezuma and other places in the vicinity.

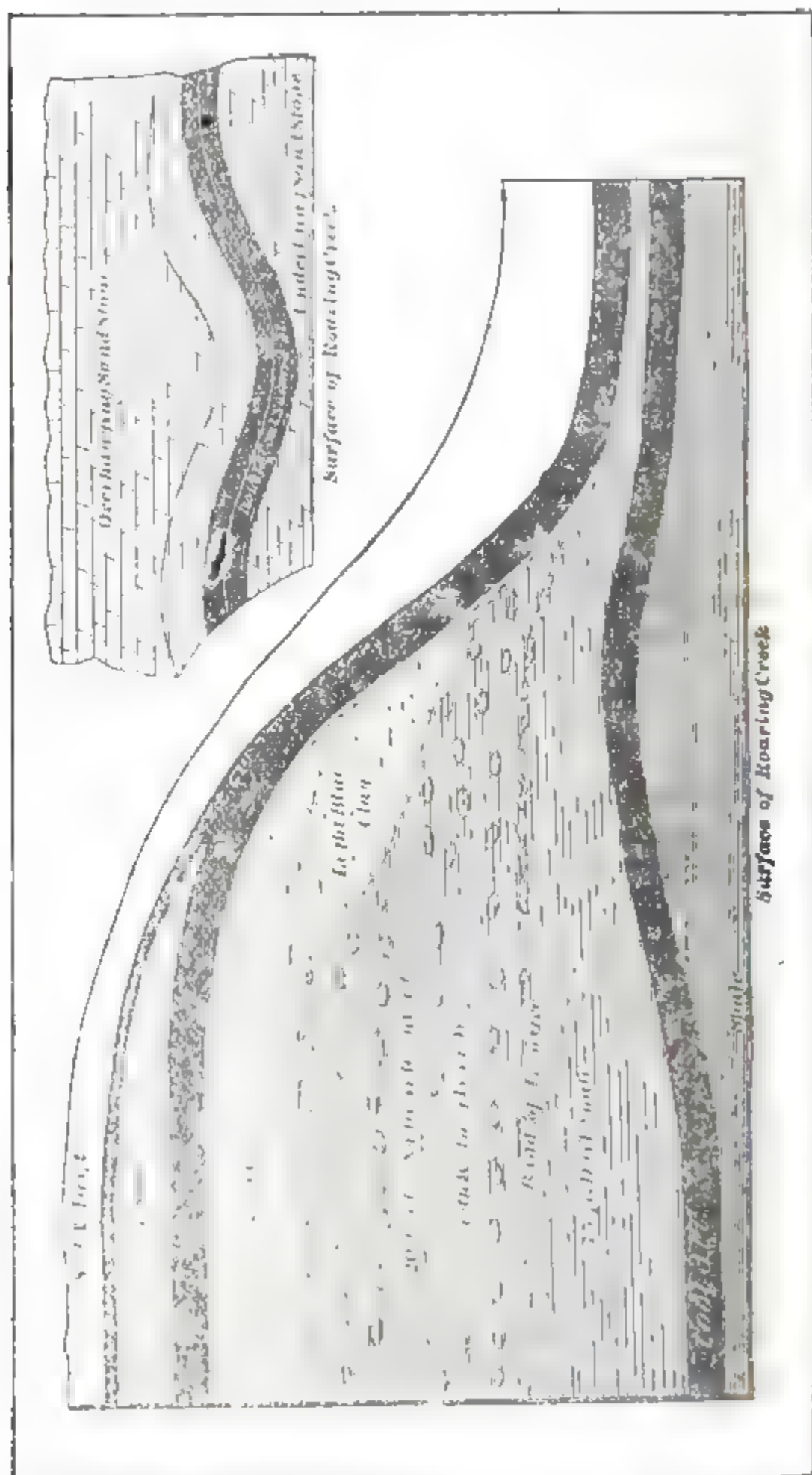
In section 4, on Solomon Woodard's place, L and M crop out in a ravine, where they are mined to good advantage. The upper seam measures about twenty inches, and is separated from the seam below by eight feet of fire clay. The lower seam, L, measures here from four to six feet. A *basin* and *horse-back* occur in this mine. In the latter, at the highest point, it measures four feet; in the *basin* it measures six feet. It is a bituminous coal, and gives good satisfaction in the market.

On the opposite side of the valley of Rocky Run, these seams are inferior in quality. A carboniferous slate is found accompanying the lower vein at this place, which is sufficiently solid and durable to make good flagging.

The upper mine can be traced up Leatherwood, cropping out on R. Outland's, Bryant's, and Perley Mitchell's places, and does not vanish until it reaches within half a mile of Bloomingdale. It is generally too thin to work to good advantage, except in places where the covering can be removed. It is of a good quality and is a semi-block coal. I think that if search was made the seam under it may yet be found in Leatherwood valley. I take it to be the same as that found in the bottom of Rock Run, southwest of Rockville, which is generally from four to five feet thick. The upper seam is usually roofed by a ferruginous sandstone, and both seams are attended by pyritiferous iron ore, usually known as "*turtle stones*."

#### ROARING CREEK.

This stream flows into Sugar creek in section 30, township 17 north, range 7. Section 32 is a rich coal district, and also section 7 in township 16, same range. The valley of Roaring creek is as tortuous as the mind can well conceive. The land is cut into peninsulas, and affords abundant access by its deep gorges to its stratified rocks. Nature here discovers some of its strange freaks that afford subjects for profound thought as well as admiration. On the land owned by D. Reynolds, in section 32, on the west side of the stream, is a denuded hillside, from which the accompanying diagram is taken. Here two coal seams, about forty feet apart, as far up the stream as they can be discovered, approach each other, the lower one with a gentle rise and the upper by a descent at an angle with the horizon of about forty-five degrees. They pass down the stream separated by a few inches of clay and shale, and become hid by the soil and vegetation. About one-eighth of a mile below, on the opposite side of the stream, these two seams are exposed in



the mines of D. Reynolds, affording an excellent supply of block coal, which would no doubt find a ready demand in any market whenever transportation can be had. The two seams will mine about thirty inches each, and being separated by but about eight inches of clay shale, and having an excellent sandstone roof, the miner will have a clearance of about six feet.

A short distance north of this mine is a like exposure, in Captain Durman's mines, where very flattering invitation is given to the miner. Tracing the gorge in which this mine occurs to its terminus in Roaring creek, these same coal seams are found still near each other; one above and the other below the surface of the stream, and yielding an excellent coal. Passing down to a narrow passage of the stream at the Rubottom mill seat between the opposite sandstone cliffs, on the right, is the cropping, evidently of the same coal seams of very inferior quality, abounding with so copious a supply of copperas that the *early settlers* used to resort to it as a mordant for their dyes. The united seams are here but about two feet. On the southwest and opposite bank can be seen, much below the level of the exposure above described, an evident extension of these seams closely and tortuously embedded between two sandstones, the lower of which is much the most friable. Passing up Roaring creek a fair show of coal occurs on the land owned by T. Nelson, in the same section. In this locality is an excellent sandstone, which serves a good purpose for foundations. On Bundy's land a little farther east, the upper seam described is worked very successfully. It is here a block coal, and measures about four feet. I think these will be found identical with Buchanan's and Mark's. This locality will some day, when reached by rail, afford abundant inducements for the miner.

#### SUGAR CREEK.

I was unable to inspect the exposures of coal on Sugar creek, immediately above and below the mouth of Rush creek. Hess' mine is represented to afford good coal. I

did not learn the thickness of the seam. It and the one south of the creek below are perhaps the same as a two-foot seam on the canal, on Wright's place, in section 6, township 16, range 8, roofed by an encrinite limestone. On Josiah Campbell's place, a two and a three-foot seam crop out—the same that will be described in Coke Oven Hollow—and roofed by a two or three-foot seam of limestone. I was unable to find an exposure that would indicate its quality or the paleontological character of the limestone roof. It has not been mined recently and the debris had covered it.

About half way up the hillside, south of the Feeder Dam, is an exposure of coal which has not yet completed the transition from the organic to the inorganic form. It presents a beautiful and conclusive evidence of the vegetable origin of coal—the fern and flag stems and leaves being so perfect that many of them can be separated and then show their forms as perfectly as if they were the relics of a preceding year. Other portions have decomposed, leaving their residuum of carbon in mass, with fossil indications less distinct.

“Coke Oven Hollow” is named from the business conducted in it by Wm. G. Coffin about thirty-five years ago. He had a foundry at “Mount Etna” near by, and procured his pig iron from Cincinnati, Hanging Rock and Pittsburg. It was transported by wagons from Cincinnati, and in order to have loading economically both ways, he mined and coked coal in this Hollow, which reaches Sugar creek just below the Feeder Dam, and would either make sale of it in Indianapolis, Richmond or Cincinnati. This is a forcible illustration of the disadvantages under which industry was placed at that day in contrast with the present, and of the discovery which has since been made of the adaptation of our block coals to the uses of the forge without the waste and loss of coking.

Four coal seams crop out in this valley.

The upper seam is a composition of clay, shale and bitumen, and has a soapy feel. It has a strong resemblance to *black lead*, but when exposed to heat the bitumen will burn

with a blaze until consumed, leaving a fire clay shale as a residuum. It will mark freely like plumbago. It measures about 15 inches. It has been used as a black pigment in oil painting and makes a neat finish. It will also, very probably, serve a good purpose for lubrication. Above this coal is a very desirable sandstone. It has very sharp grit and much of it is so white and clear that I have no doubt it will serve a good purpose for the manufacture of glass. About fifteen or twenty feet below this seam, and under a soapy clay, is found a two-foot coal seam. It is covered by a carbonized limestone. Further down the valley are two superior coal seams; the upper one measures two feet. It is covered by a sandstone roof and has been mined along its outcrop, for smith purposes, for many years, and is much valued. It is a rich caking coal. About 15 or 20 feet of shale separates it from a seam of about 3 feet near the bottom of the ravine which yielded the "Coke Oven" supply before referred to. This seam would be extensively mined if it were not too inaccessible. These seams crop out farther east on S. Jordan's place, and are being mined for the market.

#### FIRE CLAY AND "SLIP GLAY."

Near the head of Coke Oven Hollow, on R. A. Coffin's land, by some of nature's primitive forces, the strata have been cut through from north to south, and a channel of some 200 yards breadth has been made to a depth of 40 feet or more, the bottom having never been reached. R. A. Coffin's stoneware manufactory stands here. This chasm is filled with an excellent fire clay and it has, in different localities, five different varieties. The upper portion is of variegated color and the proprietor assures me that from it can be made a good article of white ware. Farther down, he is satisfied that the clay will make a fire brick that can not be excelled. He has tested it by exposure to intense heat with brick of best reputation in the market.

Another clay burns to a beautiful reddish-purple and the ware is beautifully smooth.

This fire clay has so good a reputation in the market that he has shipped, by the canal, as much as 619 tons, in one year, to Toledo, Maumee, Delphi and Attica. The supply at this place appears to be inexhaustible. His pottery establishment occupies the place made vacant by mining.

Near by, on S. Jordan's place, a very good clay is also found and on H. Little's place, half a mile west of Bloomingdale.

The glazing of the stonewares are made by a surface finish of "slip clay," which is a very fine fire clay of such chemical composition that it will melt at a less heat than the clay of which the body of the ware is made. This surface of *slip clay* thus becomes a *flux* and glazes the surface of the ware.

Formerly, potters in this county sent to Lucas county, Ohio, to Maumee City, to Seneca Falls and Albany, New York; to Independence, north of Attica, and to other distant places for supplies, but of latter times a superior article has been found in our own county west of Wildman's nursery, on I. Woodard's place, to which the craft in adjoining counties resort for supplies. It is found also below the falls of Wabash Mill Creek and on Josiah Campbell's place below Feeder Dam. I do not know what judgment has been reached by experiment with the latter. I think it probable that it may be also found on Peache's land in Jackson township. Fire clays extend so nearly all over the county that the supply may be regarded as inexhaustible for all time, and the best varieties can be found.

A few hundred yards above Feeder Dam is a show, above the stream of millstone grit, or conglomerate sandstone. It rises above the stream and sinks beneath it at various points all the way up to the Narrows, where it rises into the uplands and gives place below to the limestone deposit. About one mile above the dam is a fine display of iron ore on a forty-acre lot owned by Milligan of Wave-land. This is mainly in kidney nodules in a bed of shale,



but a heavy band or bed of ore is found near the bottom of the stratum. The miner is especially invited to an examination of this spot. In the ravines above is a beautiful display of excellent building sandstone in massive cliffs waiting to be borne to some distant market where it would be of priceless value. Above it, on Ephlin's place, is a nice outcropping of a four-feet coal seam—but, having no solid roofing to protect it from the debris above it, has not been successfully mined. When the demand will justify, a shaft may reach it from the table lands.

A short distance above Milligan's Iron Bank is a legendary spot. In "early times," the Indians, it is said, found a supply of lead in the bed of Sugar creek at this place. They would wade into the stream and feel the ore with their feet and thus procure their supplies. They were not disposed to show the pale faces the spot, and soon after they had left their hunting grounds, the construction of the Wabash and Erie Canal demanded a feeder dam across the stream below and the search for lead in its bottom was made hopeless. The canal dam having gone into decay the stream may in time be reduced to its former level and the lead hunters may yet hope for success.

Between this point and Rockport is another very gratifying exposure of coal. At Starkey's mines, on the south side, much very good bituminous coal has been mined from a two-feet seam. On the north side of the stream, in section 35, on Weaver's and Noland's lands, are found two good coal seams, bedded on fire clay and with sandstone roof. The upper seam is about two feet, and the lower one three feet to three feet five inches.

This coal is about half a mile below the crossing of Sugar creek by the New Albany and Salem Railroad, and can be made very accessible by switching.

On H. Weaver's land is a very excellent chalybeate spring in a deep and romantic valley, which can not fail in time to be a cool summer resort for the invalid, when travel to it shall be made easy.

As we approach Rockport, the conglomerate sandstone

makes a rapid uprising, and the coal seams melt into a friable combination of bitumen, sand and slate.

At Rockport are found on both sides of Sugar creek a high and massive projecting sandstone, which will serve an excellent purpose as abutments for the North and South Railroad bridge that is expected to cross at this place. Near the line of the road is an excellent sandstone, as fine as any I have seen in the county, except the Mansfield stone. It will no doubt some day find its way to Chicago. But little coal is found between this place and Roaring creek. Square Rock Branch, however, is a locality of some interest. It is on Robert Wright's place, about one mile above Rockport. A two-foot seam of black limestone is here exposed, which has very regular lines of fracture. It has over it and under it a black clay which has become incorporated with it so as to give it color. It is quarried in square blocks, from 6 to 18 inches in breadth, and from 6 inches to 1 foot in thickness. It will admit of a good polish, but is not sufficiently indestructible by exposure to the weather to render it valuable for foundations, or for furniture tops. A seam of iron ore is under it, and is also fractured with great regularity into cubical blocks of different sizes. It rests on a fine, carbonized clay, in a stratum measuring about six inches. It has been found to make a good polish for shoe blacking, and will serve a good purpose for lubrication. The experiment has been made to wagon this iron ore to Terre Haute, but the cost of transportation was found too great.

On section 30, township 17, range 7, a very desirable coal crops out on the north side of Sugar Creek, on H. Russell's land. It mines 3 feet 8 inches, and is a rich, semi-block coal. It appears clear of sulphur, has a sandstone roof, and its bed is fire-clay. This seam is found also on J. Moore's place, near the mouth of Mill creek, and just above his mill, in the bed of the stream. It measures about five feet. In the north bank of Mill creek, at this point, is a two-foot seam of coal, under a sandstone cliff. I think it probable that these two seams are the two seen at

Buchanan's, along Roaring creek, and on Mill and Green creeks above. At Moore's place they have not been sufficiently worked to learn their qualities. Some months ago, in time of a freshet, the waters from J. Moore's dam, cut through the coal underneath, and mined it out in large blocks.

In sections 3, 10, 14 and 15, can be found an exceedingly rich coal field. Two seams crop out on both sides of Mill creek. Near the county line, at J. Lawson's mines, the under coal seam measures from five to six feet, and is made up of three strata. The upper is block, the middle a seam of pyritiferous iron ore and cannel coal, and the lower bituminous coal. The amount of sulphur must greatly impair its value. This coal also, is remarkable for its minute septæ of calc spar. Much depends on the care of the miner in assorting this coal for the market.

About a quarter of a mile west is another exposure on G. Barker's land which makes a show of much better coal. It mines from four to five feet. It yielded a good article of block coal in the upper stratum of the seam, and the lower stratum is a rich bituminous coal. About two miles below, on G. Barker's land, a bank had recently been opened, which made a fine show of good block coal, apparently free from sulphur. I saw no indication of a difference in quality as in the mines above. In the bluffs east of Ward's Mills, (Russell's Mills,) two coal seams are found, but they were not sufficiently exposed to indicate their thickness or qualities. One mile and a half west, on Green creek, these coals again crop out. They make a good showing on Barker's and Ratliff's lands. At the former place, the principal mine is in the creek bottom and is mined six feet, the bottom has not been found on account of water. The upper three feet is an excellent block coal and the lower stratum is bituminous. This coal will probably be found as desirable as any coal in the State. In the bank about fifteen feet above, is a good showing of another coal seam. Both seams are roofed by limestone and are separated by shale. The upper seam is but partially exposed. No one appeared to know its thick-

ness. It is considered not less than five feet. These two seams evidently are under the North & South Railroad, from Sugar creek northward into Fountain county, and can be readily approached anywhere by shafts and switches. They are probably the same as the two mined on Coal creek, in Fountain county, which measure three feet three inches and three feet nine inches.

#### RUSH CREEK.

Along this stream, on C. Farner's land, a good showing of coal is seen, which supplies the smiths in the vicinity, also on Huxford's lands below, but its thickness could not be ascertained. A two-foot seam and a less one are found outcropping in various places along the canal from Sugar creek to Howard, covered by encrinite limestone. The coal seams, for some cause, become thinner as we approach the Wabash, or in other words, as we leave the circumference of the coal basin. I am inclined to favor Professor Cox's hypothesis, that it was only in shallow water that coal plants grew luxuriantly, and as the waters deepened the coal deposits were less abundant, and would at a sufficient depth entirely fail, hence one of the great irregularities of coal seams, and of their disappearance entirely in certain localities. It is probably for this reason the coal seams maintain their thickness with much uniformity from north to south along the outer rim of the coal basin and diminish in their measures as we follow them westwardly.

#### NARROWS OF SUGAR CREEK.

The scenery here is wild and picturesque. Heavy cliffs of beautifully white, yellow and cream colored conglomerate sandstones are found on both sides of the stream, and if reached by rail would afford a very desirable supply of stone for building as well as for glass manufacturing. An excellent laminated sandstone is also found here, that can be split into desirable thicknesses for flag stone. Half a

mile above, a *bastard sandstone* is quarried, which is a rare material for flagging. It is on H. Lipsie's land.

The white sandstone above referred to is on J. Lusk's land. The ledge is capped with it as at Roseville. It is a clear white stone with a sharp grit, and crushes easily, but completely resists when exposed to the disintegrating power of the weather.

The "*Narrows*" at this place is a narrow passage of the stream between two perpendicular walls of sandstone about thirty-two feet high and of fifty-five feet span. During high water, the stream rushes with a whirl through this deep gorge with tremendous force. A second and narrower channel is found some fifteen feet deep in the river bed, with offsets on either side, at the bottom of which, I am informed, is limestone.

#### NEWLIN, M'MURTRY'S AND CANNON'S COALS.

About one and a half miles above "*The Narrows*" is a valley of more than ordinary interest. It gives the following section of the rocks of that locality. It is an interesting fact that here the conglomerate sandstone again gives place to the regular coal and shale foundation; this section reaching down to the water surface without finding it. Near its entrance into Sugar creek, cannel coal is found a few feet below the surface, under the sediment of the stream and near its head. In Cannon and McMurtry's mines it occurs above the block coal, making about an eight or a twelve-inch seam. In the ledge of sandstone found along this valley, the *Lepidodendron* and *Sigillaria* fossils, some of which are seen quite large, instead of being petrified as is usually the case, are converted into cannel coal. Clumps of this fossil coal are seen all through the sandstone without any connection with or being a part of any regular seam, and showing perfect impressions of the bark of these coal plants. About half a mile east of this valley, on W. M. Newlin's land, was found two large blocks of cannel coal, containing about eight cubical feet each, detached from their original stratum,

which will no doubt be found near by. These blocks are now in the collection of the State Geologist at Indianapolis, and weigh 890 pounds. The sandstone in this locality is generally a rich fawn skin color, and answers an excellent purpose for foundations.

The section given commences perhaps fifty or seventy-five feet below the general land surface above.

SECTION OF THE ROCKS IN SECTIONS 25 AND 36, TOWNSHIP 17, RANGE 7.

No. 1. COAL—Semi-block, with a seam of cannel coal on top, varying from ten to twelve inches.....	4 ft.
No. 2. BLACK SHALE.....	20 ft.
No. 3. COAL—Quality not determined.....	1½ ft.
No. 4. IRON STONE—Regularly fractured.....	4 to 6 ft.
No. 5. DARK BITUMINOUS SHALE.....	15 ft.
No. 6. BAND OF IRON ORE.....	1 ft.
No. 7. SHALE and IRON ORE.....	4 ft.
No. 8. SANDSTONE—With cannel coal fossils..	30 ft.
No. 9. Band of Iron Ore.....	1 ft.
No. 10. COAL.....	1 ft.
No. 11. SHALE—With Iron Ore.....	40 ft.
No. 12. Sugar Creek.	

GENERAL INFERENCES.

*Number of Coal Seams and their Character:* Eight coal seams are discoverable in Parke county. The four upper seams appear to be confined to the southwest portion of the county, and to the high land between Rockville and the Wabash, extending as far north as the breaks of Sugar Creek.

Seams K, I, G, and F or A, are found generally through the county, except the northeast portions of Green and Howard townships. They generally diminish in thickness as we follow them westward, but increase in measure as we advance northward. Seams K and I, which are about three

and four feet in the southern portion of the county, measure, north of Sugar creek, five and six feet. K is a semi-block coal. It is well adapted to steam purposes. Sometimes it assumes a block like form when mined, but most generally breaks into cubical forms. Carbonate and sulphate of lime are often traceable in its joints, and sometimes sulphate of iron.

It will not resist the action of the weather equal to some other coals which impairs its value for extensive transportation unless protected. It has more than ordinary volatile matter, and yields a superabundance of smoke when burned. It is valued by blacksmiths on account of the hollow arch formed by agglutination in burning. Its lime and other mineral admixtures unite to form a flux and there results more or less clinker.

Since the Logansport, Crawfordsville and South Western Railroad has opened a way for the transportation of this coal, the corporations of Nye & Co. and the Parke County Coal Company have done an extensive mining business on Sand creek, and I find their coal ranks among the best in the Indianapolis market for locomotives, for general steam purposes, and for grates.

These coal seams are subject to much irregularity on account of the wave-like foundation of the conglomerate sandstone on which they rest, as at Roseville and Big Raccoon above Feeder Dam at Rockport, and the "Narrows" along the valley of Sugar creek, coal being found often only in the intervening valleys and cut off by sand ridges which perhaps rose above the surface of the lake in which the coal plants grew.

Who knows but the Creator in his fourth day's work had a special design in giving us access to most invaluable building material through the same medium of transportation which would furnish fuel for the manufacturer and the forge-fire? I know of no locality which brings so many rich treasures into so close proximity.

I had hoped in this survey to be able to discover some reliable law of dip and level that would be a guide to the

miner and enable the land owner to make some probable estimate of what is buried beneath his soil, but the more I traced the variations in level and the uncertainty of even the existence of coal seams at any given locality, the more completely am I satisfied that such knowledge can only be determined by boring and by the shaft.

#### LIMESTONE, FIRE CLAY AND IRON ORE.

*Limestone*: This stone is found as a roofing for coal K generally over the county and often in connection with other strata. It is often sufficiently durable to serve for foundation stones and it will burn into a good article of lime.

Should this limestone not prove sufficiently pure for fluxing iron ores, a supply can be readily found of the best material on the eastern borders of the county.

*Fire Clay*: This valuable material is general and abundant, from a very fair or light color to a dark blue, and sometimes mottled with yellow and red, and from a gritless clay to a silicious admixture which furnish almost any variety of material for the manufacture of wares and the very best of fire brick.

*Iron Ore*: Banded and kidney ores are abundant throughout the county, and may be estimated to yield about 33 per cent. of iron. Very good clay ironstones are found on Mill, Roaring, Sand, and Little Raccoon creeks. Professor Foster has classified them under the following three heads:

I. *The Impure Carbonates of Iron*, including clay ironstones, in flattened spheroidal masses, and in bands more or less continuous, associated with argillaceous shales.

II. *The Brown Sesqui-Oxides*, or *Limonites*, intermixed white potters' clay—a modification of No. I.

III. *The Silicious Oxides*, at or near the base of the heavy bedded sandstone, the result, no doubt, of permeating waters highly charged with protoxide of iron.

These ores indicate sufficient richness to justify smelting, whenever facilities can be had for cheap and ready transportation. Especially do they show that the county has all



the desirable ore for admixture with those of Missouri and Lake Superior, for smelting and manufacturing purposes.

Prof. Cox, and Prof. Foster of Chicago, have both given a favorable opinion in reference to the adaptation of the Parke county coals to the manufacture of iron. I can not discover any evidence of deterioration in the quality of the block coals as we advance from Brazil and Carbon to the northern extremity of the county, and shall expect the capitalists to find safe and profitable locations for smelting ores through its entire length, whenever railroad transportation shall prepare the way.

ANALYSIS OF COALS OF PARKE COUNTY.

*Buchanan's Coal*: Section 23, township 16, range 7. Specific gravity, 1,232; a cubic foot weighs 77 pounds.

Coke,	-	-	64.5	{	Ash, white,	-	-	-	2.0
				{	Fixed carbon,	-	-	-	62.5
Volatile matter,			35.5	{	Water,	-	-	-	4.5
				{	Gas,	-	-	-	31.0
<hr/>								<hr/>	
100.0								100.0	

*Sand Creek, Nye & Co.*: Sections 22, 27, 28, 34, township 16, range 7. A cubic foot weighs 77 pounds.

Coke,	-	-	58.5	{	Ash, white,	-	-	-	2.5
				{	Fixed carbon,	-	-	-	56.0
Volatile matter,			41.5	{	Water,	-	-	-	3.0
				{	Good, illuminating gas,	-	-	-	8.5
<hr/>								<hr/>	
100.0								100.0	

BORINGS.

*At Bloomington:*

Soil.....	5	ft.
Quicksand and gravel.....	10	ft.
Blue clay, hard pan.....	42	ft.
Sand rock, bastard ?.....	14	ft.
Slate.....	2	ft.
Coal, indicated.....	0	ft.
Fire clay.....	4	ft.
Black clay shale with sandstone.....	27	ft.
Gray slate.....	10	ft.
Block coal.....	3½	ft.
Potters' clay.....	0	ft.

*One and one-half miles north of Bridgton, Charles Caldwell, borer:*

Surface drift.....	12 ft.
Hard pan.....	3 ft.
Fire clay.....	10 ft.
Soapstone, sand rock and shale.....	4 ft.
Dark slate.....	3 ft.
Streak of burnt coal, sand rock, dark slate and shale.....	20½ ft.
Sandstone, yellow.....	5½ ft.
Sandstone, blue, with streaks of slate.....	2 ft.
Sandstone, gray.....	5 ft.
White limestone.....	3 in.

*At Bridgton, north side in bottom of the stream, C. Caldwell, Borer. Crossing of North & South Railroad:*

Drift.....	8 ft. 0 in.
Gray hardpan.....	5 ft. 0 in.
Block coal.....	2½ ft. 0 in.
Fire clay.....	0 ft. 6 in.
Block coal.....	2½ ft. 0 in.
Fire clay.....	10 ft. 0 in.
Slate.....	1 ft. 2 in.
Fire clay.....	1 ft. 0 in.
Sand rock, gray.....	1 ft. 0 in.

#### EXTENT AND VALUE OF THE PARKE COUNTY COALS.

There is an area of about three hundred square miles of workable coals in Parke county, which, I think, may be safely estimated to average a mining thickness of five feet. Each solid foot will weigh seventy pounds, which is one-tenth below the common estimate. Their measure will then be about one and a half billion tons, which, at thirty cents, their value in the mine, may be estimated at about \$440,000,000, or about fifty times the present estimate of the value of the taxables in the county. At three dollars per ton, their cost on the cars, their value will reach the enormous sum of near four and one-half billion dollars, and in the Chicago market twice that sum. This estimate will give us some faint idea of our material hidden wealth that is waiting for the laborer, of the value of the miner's labor, and of the work and expense incurred in transportation, and also of the vast inter-

est the county, State, and the country have in the development and reduction of our mineral resources, leaving our iron, clays and sandstones out of the estimate. It will also suggest the influence such masses of mineral wealth must have on the construction of railroads for their transportation.

#### THE CONTEMPLATED RAILROADS OF PARKE COUNTY.

It may be discovered that to reach all the varieties of coals in Parke county it is necessary to construct the road which is to bear them to market along their eastern outcrop, instead of across it, since these coals diminish in thickness and in value as we go westward.

The North and South Railroad has successfully found this line, and crossing the streams of the county at right angles it is favorably situated for sending lateral branches up and down the valleys to which coal, stone, lumber, every commodity, can find an easy approach. Other roads will find it convenient as a feeder along its entire line. When it shall be completed I can think of no road that can anticipate a more desirable business.

The Indiana and Illinois Central will pass over some of the best coals in the county and by sending a track down Big Raccoon to Mansfield, may reach the very desirable brown sandstones in that locality, and the good coals on Roaring creek can also be readily approached by switch. When these roads shall be made, they, with the Logansport, Crawfordsville and Southwestern Railroad, will cause Parke county to take an enviable rank among her sister counties in the business of mining and iron manufacture.

#### SOIL AND TIMBER.

*Soil:* The surface of Parke county is drift. It varies in different localities. It may be classified into five general divisions:

1. *Alluvium* or river bottoms.
2. Sandy soils.
3. Loamy uplands.
4. Red or yellow clay.
5. Wet or light clay.

These several soils having been brought from other regions by drift or glacial action and by the streams, they bear no relation to the rocks beneath them.

The alluvium in the "river bottoms" is charged with all the elements desirable to promote vegetable growth. Abounding in phosphates, the corn fields which skirt the Wabash and are found on both sides of many of our streams, varying from half a mile to a mile in breadth, are unsurpassed for luxuriant growth and for the abundance of their yield. These soils are washed from the uplands, and when the river bottoms are flooded, a new supply is deposited as sediment. They can by this means be kept in constant cultivation without other fertilization.

2. *Sandy Soils*: These are found in what is usually known as "second bottoms," or the level lands bordering the "river bottoms." They are generally beds of sand and gravel covered by a dark rich soil and are adapted to all kinds of edible grains, and are the most desirable lands for general culture. The drift soils generally contain a great variety of chemical elements and whether in uplands or lowlands are such as are well adapted to all kinds of agricultural productions.

In the western portion of the county lying north of Sugar creek, the upland is a continuous sand bed, presenting a rolling surface; also the southwestern portion of the county south of Rosedale, is, with the exception of the wet prairie previously referred to as the probable former channel of Big Raccoon, much of the same character.

*Loamy Uplands*: All the uplands of Parke county possess a sufficiency of sand to render them easily pulverized. They are not apt to bake or become cloddy, as is common with purer clays. There is in the upland soils but little uniformity, left as they have been by water currents or glacial action, or both. On the same farm, and on the same level, may be found a rich, black, deep prairie soil, while in an adjacent field will be a yellow or pale earth. Much of the upland surface of Parke county is of this rich, dark, loamy soil, and yields a harvest, in favorable seasons, that competes well with the bottom lands.

*Red and Yellow Clays:* These clays alternate with the dark loam, and retain well any fertilizing element. They are well adapted to clover and the small grains. This county has no superior for wheat. It rarely fails to give a desirable harvest, and has within the past few years produced a good crop, when in many other portions of the State wheat has failed. These lands yield very excellent corn, especially in the middle and eastern portions of the county, where the surface is more level and retains its *humus* by filtering its waters, rather than parting with them by rapid drainage.

*Pale Clays:* These clays are common in the flat uplands, and beech and white oak abound on it. It retains moisture well in dry seasons, and when treated generously by a rotation of crops, and turning into it occasionally a clover or blue-grass sod, it proves to be a very productive soil. Under drainage not only takes away the superabundance of water that is left on its surface because of its impervious nature, but induces a porosity which enables the roots of plants to obtain a supply of air as well as to penetrate to the moisture beneath in time of drouth. Some of these lands, which were once thought too poor to be purchased, are now found to make the most desirable farms. They also yield some of the best timber in the county.

Making a general average of all their good and less desirable qualities, including healthfulness, a good Providence has made an excellent average of His blessings in Parke county, and anywhere in it is a good place to live.

#### TIMBERS.

Parke county embraces in its forests nearly all the desirable timber trees of the State. Its flora embraces the varieties of the prairie as well as of the woodlands. The poplar, oak, walnut, ash, cherry, sycamore, hickory, maple, beech and elm are found in their several varieties for this latitude, and in some portions of the county attain a height, symmetry and diameter unsurpassed in the State.

## FLORIDA TOWNSHIP.

The white and burr oak and the poplar are the leading timbers of this township. The walnut is found where the lumberman has not been. The canal on the west, the railroad on the east, and the prairie demand from Illinois, has depleted the timbers in this section of the county.

Liberty, Reserve, Wabash, Penn, Washington, Adams and Raccoon townships have some magnificent forests of excellent timbers, but the demand from Illinois, home consumption, and the railroad and canal have all been busy in seeking the best of them. In many less accessible places, some valuable oaks and poplars are still found.

## JACKSON TOWNSHIP.

The deep valleys and numerous hills in this township have hitherto been obstructions to the lumberman, and preserved its fine forests in many places in their primeval beauty and grandeur. I have never seen more desirable poplars or oaks in any place. I measured one white oak at two and a half feet above the ground, and found it sixteen feet ten inches in circumference, and another was about eighteen feet. The poplar is of corresponding girth and very tall. Other timbers are proportionately large. When a railroad can find its way up the Big Raccoon valley, a very profitable business will grow up in this portion of the county in timber and stone.

Union and Howard townships are very analogous to Jackson township in every particular except in the amount of broken land. They have fine forests, and their remoteness from good transportation has prevented their abundant timber from being destroyed.

Green township is now traversed by the Logansport, Crawfordsville & Southwestern Railroad, and the abundance of sawed lumber along the line shows the activity that is at once given to the trade when easy transportation is found to the market.

Along the bluffs of Sugar creek and its tributaries, the

hemlock is seen, which gives a cheer to the winter scenery. Much of it is of desirable size for lumber.

The following classification will exhibit the character of our principal forest trees. I have not deemed it proper here to attempt a full exhibit of the flora of the county. The very excellent report of Prof. A. H. Young, of Hanover, on the flora of Jefferson county, in the Geological Report for 1870, will be found to be a general description of the flora of this region. Parke can add a few prairie flowers which are not found in the highlands of that county.

#### TREES COMMON TO PARKE COUNTY.

Ash, White or Gray, *Fraxinus americana*—very abundant.

Ash, Blue, *Fraxinus quadrangulata*—common.

Ash, Swamp, *Fraxinus platycarpa*—occasional on low lands.

Beech, *Fagus ferruginea*—very abundant.

Crab Apple, *Pyrus coronaria*—often found; not very abundant.

Buckeye, *Æsculus glabra*—very common in river bottoms, and in rich uplands.

Coffee Nut, *Gymnocladus canadensis*—occasionally found.

Cottowood, *Populus monilifera*—abundant along streams; occasional on the upland.

Dogwood, *Cornaceæ cornus*—very common.

Elm, Red or Slippery, *Ulmus fulva*—common.

Elm, White, *Ulmus americana*—common.

Elm, Hickory, *Ulmus racemosa*—common in low grounds.

Gum, Black, *Nyssa multiflora*—abundant.

Gum, Sweet, *Liquidambar styraciflua*—seen occasionally; rare.

Hackberry, *Celtis occidentalis*—frequent.

Hazel, *Corylus americana*—abundant in the south and west.

Haw, Red, *Crataegus æstivalis*—common.

Haw, Black, *Viburnum prunifolium*—occasional.

Hickory, Shellbark, *Carya alba*—abundant.

Hickory, Western Shellbark, *Carya sulcata*—abundant.

Hickory, Brown or Pignut, *Carya porcina*—frequent.

Hickory, Water, *Carya aquatica*—common along the streams. Excellent for ax-handles.

- Ironwood, or Hornbeam, *Ostrya virginica*—common.  
 Honey-Locust, *Gleditschia triacanthos*—occasional.  
 Linden, or Basswood, *Tilia americana*—common.  
 Maple, Sugar or Rock, *Acer saccharinum*—very abundant.  
 Maple, White or Silver, *Acer dasycarpum*—found along the streams.  
 Maple, Swamp, *Acer rubrum*—very common.  
 Mulberry, *Morus rubra*—common.  
 Oak, White, *Quercus alba*,—large and very abundant.  
 Oak, Burr, *Quercus macrocarpa*—large and abundant.  
 Oak, Chinquapin, *Quercus prinoides*—common.  
 Oak, Black Jack, *Quercus nigra*—occasional.  
 Oak, Red, *Quercus rubra*—occasional.  
 Oak, Pin, *Quercus palustris*—common.  
 Pawpaw, *Annona triloba*—very common.  
 Poplar, or Tulip Tree, *Lyriodendron tulipifera*—very abundant  
 Red Bud, *Cercis canadensis*—common.  
 Spicewood, *Lindera benzoin*—common.  
 Spruce, Hemilock, *Abies canadensis*—common on Sugar Creek and tributaries.  
 Sycamore, *Platanus occidentalis*—very abundant along the streams; occasional on the upland.  
 Walnut, Black, *Juglans nigra*—abundant.  
 Walnut, White or Butternut, *Juglans cinerea*—common.  
 Water Beech, *Carpinus americana*—common.  
 Wild Cherry, *Prunus serotina*—common.  
 Willow, *Salix cordata*—common along the streams.

## GRAVEL.

Along the “*Second Bottoms*” of the Wabash, Sugar creek and the two Raccoons, beds of terrace gravel are found, and in the channels of all the streams, gravel and sand bars are numerous, and yield supplies for roads and other purposes in their vicinity. Very frequently deposits of drift gravel, are found along the *bluffs* in the uplands, of an excellent quality.

## WATER POWER.

No county in the State, except Wayne, has so many and desirable mill streams as Parke. Sugar creek, the two Mill creeks and the two Raccoons, are excellent mill streams.



Many of their tributaries, in an earlier day, supplied power for both grist and saw mills, but during the past thirty years they have been gradually failing. The removal of forests, of the underbrush and of the abundant decomposing vegetation, which absorbed and retained the waters from rains, and facilities afforded for drainage by cultivated fields, together with the corresponding facility thus given to the action of the sun and air in the process of surface evaporation, all these causes are combined in the diminution of the currents of our streams. The ruins of saw and grist mills are now found along their valleys where was an active business thirty years ago.

The ingenuity of the age having brought the steam engine to a great degree of perfection and adapted it so completely to every desirable location that the necessity for water power has diminished with the diminution of supply.

There are still great manufacturing interests that must depend largely on a copious supply of water power, and when approached by rail, Sugar creek, Big and Little Raccoon and others of these streams will afford privileges rarely found.

At Mecca, on Big Raccoon, is a large woolen factory, flouring mill and saw mill owned by Lowry and Batman. Excellent flouring mills are also found at Bridgton and Mansfield on the same stream, at Rockport on Sugar creek, and at J. Moor's and C. Ward's on Mill creek.

The general supply of water through the county by spring and wells has been attended by a diminution corresponding to that of the streams. During the past few years wells very generally have required to be deepened, and many springs, which once were regarded as never-failing, have ceased to flow during summer.

The well digger rarely has to encounter stone in sinking for water. If it is not found above, or in the blue clay, he is very sure to meet an abundant supply under it. Water by wells is found in drift, or terrace sand and gravel. Springs often appear along the hillsides among the rocks, but most generally where the valley sinks below the drift.

## ACKNOWLEDGMENTS.

I am under obligations to Thomas Nelson, James H. Rogers and William Jarvis, Commissioners, and to John H. Tate, Auditor of Parke county, for many favors. And for hospitalities and assistance in various ways in my field work, in—

*Adams Township*: Gen. G. K. Steele, Wm. H. Nye, J. Pickard, J. T. Campbell, and McMillon, Stark & Dooley.

*Washington*: A. Buchanan, Esq., and J. Strong.

*Sugar Creek*: J. Garrigus, J. Lusk, and J. Moore.

*Liberty*: J. Wright.

*Reserve*: S. Woodard, W. B. Morris.

*Wabash*: Wm. Hixon, Lowry & Batman, and J. Butler.

*Florida*: Jos. Wilson, J. Blaize, A. Lewis, and J. W. Mark.

*Raccoon*: Dr. Crooks and D. Kalley.

*Jackson*. Col. C. Johnson, C. Pruitt, G. W. Hansell, and W. Peach.

*Union*: L. C. Acker.

*Green*: R. W. Cooper.

*Penn*: H. Weaver, R. A. Coffin, Capt. Durman, J. Ephlin, H. Little, P. Mitchell, and S. Jordan.

*Howard*: W. M. Newlin.

Respectfully submitted,

BARNABAS C. HORBS.

PROFESSOR E. T. COX,  
*State Geologist, Indianapolis, Ind.:*

DEAR SIR—I have the honor to submit, herewith, my  
Report on the Geology of Dearborn, Ohio and Switzerland  
counties.

Yours truly,

ROBERT B. WARDER.

CLEVES, OHIO, Dec. 1, 1872.



# G E O L O G Y

OF

## Dearborn, Ohio and Switzerland Counties.

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### CHAPTER I. SURFACE FEATURES.

Dearborn, Ohio and Switzerland counties, all bordering on the Ohio river, present such similarity in structure and character that it is more appropriate to make a report of this district as a whole, than to describe each county separately.

This district extends forty-three miles from north to south, and twenty-one and a half miles from east to west. The area is as follows :

Dearborn county.....	186,311 acres,	291.11 square miles.
Ohio county.....	54,749 acres,	85.54 square miles.
Switzerland county...	143,053 acres,	221.96 square miles.

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Total .....	383,113 acres,	598.61 square miles.
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A line drawn from the mouth of the Kentucky river to Fort Recovery, Ohio, was the western boundary of the land ceded to the United States by the treaty of Greenville, Aug. 3, 1795. This line is known as the Old Indian Boundary, and separates Dearborn and Ohio counties from Ripley.

## TOPOGRAPHY.

As we pass from the Ohio river to the higher parts of the district, we observe a pleasing variety of hill, valley and plain. On leaving the river bottoms and terraces, which are often a mile in width, we ascend the comparatively rugged, but fertile river hills, then pass over broken upland and reach the wet flats where there is often so little natural drainage that water stands on the surface under the oak and beech timber a great part of the year. Hence the local name *slash* given to such land, perhaps from the sound produced in walking over it. The rock formations of this district consists of layers that were originally deposited horizontally, and the Cincinnati uplift affected the whole district so uniformly that very little dip is observed. We can not therefore, attribute this variety of topographical features directly to any upheaval of the rocks, or dislocation of strata. Neither have I seen any marks of erosion that can be attributed to glacial action, unless the broad area occupied by the Miami bottoms and the adjoining terraces be so explained. The valleys must therefore have been formed by streams of water; that is, by the streams that now drain this part of the State, or by those that may have drained it in former ages. It is possible that some changes of the surface were wrought by the tides and currents as the continent was emerging from the ocean, but these agencies could only affect the higher parts, and have not been traced with any certainty.

There is such an intimate relationship between the topographical features and the characters of the soil and agriculture of the several parts of this district, that I have thought necessary to discuss the subject somewhat in detail. As the map will show, there is a portion of flat upland embracing a district near the water-shed, between the White-water River and other tributaries of the Ohio on the east, and Laughery creek on the west. A similar area stretches nearly across the north part of Switzerland county. Much of this land is less flat than a similar part of Ripley county, but

still retains the waters, especially in the native timber, and merits the usual appellation of "White Oak Slash." The most level fields are on the highest ground, forming the water-sheds between the several creeks. As we leave the water-sheds the ground becomes more and more uneven, till by imperceptible degrees we reach the *broken upland*. This will average at a considerably lower level than the flats, but is still high ground; the water here accumulates with sufficient force to wash the soil very badly, if care is not taken to prevent it. The next belt represented on the map includes a still more broken area, which we will term the *hillsides*. These rise abruptly from the river terraces, but can not be distinguished by any rigidly defined boundary from the broken upland. From the "white oak slash" or "crawfish flats," the ravines gradually become deeper, the general surface becomes lower, and the slopes become steeper toward the river and creeks. The base of the hill is very distinctly marked; the other topographical boundaries are selected as the most convenient to present the facts, but they must not be regarded as representing definite lines of demarkation.

The amount and character of erosion displayed in the valleys depends upon the nature of the material to be worn, the amount of water in the stream, and the amount of its fall in a given distance. The larger streams have been acting with such force that a considerable part of their course is now below high water mark of the Ohio River. The points reached by the backwater of 1847, in the larger creeks, are marked on the map. The rivulets that rise on the upland, within a mile or two of the river bottoms, have a fall that enables them to cut deep ravines and make the surface very hilly. The parts farthest removed from the rivers and large creeks, are least affected by erosion, and retain much of the original character of the plain.

It has been suggested that part of the Miami valley may be due to glacial action. This view is supported, besides other circumstances, by the comparative width and the direct course of the area of low land lying on the White-water in Hamilton county, Ohio, and on the Miami below

its junction with that stream. If this is the correct theory, the glacial valley extended at least as far west as Lawrenceburg, and it is remarkable that there is a deep surface valley in Kentucky, from above Petersburg to nearly opposite the mouth of Laughery creek. This Kentucky valley is narrower than that of the Miami, with which it corresponds in position and course. At the lower end is a mass of cemented gravel, about 150 feet in height, commonly called "Split Rock." Similar masses occur below. The hypothesis naturally suggests itself that the valley may be a continuation of the glacial valley described above, and "Split Rock" part of the terminal morain. Slabs of blue limestone occur among the gravel, as though torn from the beds by the advancing glacier.

A table of elevations has been prepared from such data as I could command\*. Rigid accuracy can not be expected, even when elevations were obtained by an engineer's level, since all the heights were not measured from a common base. I have assumed the surveys of the Ohio and Mississippi Railroad to be correct, as the base was determined with great care from canal levels. According to these data, low water at Cincinnati is about 410 feet above the sea level.

I have selected prominent points from the upland; the elevations refer to tide water.

#### FLATS.

Summit of grade near Sunman, Ripley county, 1,007 feet, obtained by the Indianapolis, Cincinnati and Lafayette Railroad level.

Summit of grade near Milan, Ripley county, 1,000 feet, obtained by the Ohio and Mississippi Railroad level.

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\*I am indebted to the engineers of the Indianapolis, Cincinnati and Lafayette and Ohio and Mississippi Railroad Companies for the use of profiles; and to Messrs. E. M. LeClerc, U. P. Schenk and Grisard, of Vevay, Mr. J. M. Froman, Mr. M. G. Keeney, of Florence, and Mr. Nathan North, of Millersburg, for the use of turnpike profiles and tables of Switzerland county.



General level of high ground in northwest part of Switzerland county, 950 feet, obtained by Aneroid barometer.

Moorefield, 885 feet, obtained by turnpike level.

High point near schoolhouse, one mile south of East Enterprise, 910 feet, obtained by turnpike level.

Quercus Grove, 870 feet, obtained by turnpike level.

#### BROKEN LAND.

Dillsborough, 785 feet.

High points, southwest part Switzerland county, 875 feet, obtained by Aneroid barometer.

Ridge, south of Guilford, 775 feet, obtained by Aneroid barometer.

"Seminary Hill," near Vevay, 706 feet.†

#### RELATIONS OF TOPOGRAPHY TO HISTORY, ETC.

Topographical features bear an intimate relation to the engineering of roads and railroads, and therefore to the histories of these counties. In laying out a road from the low land on the river, towards the interior, advantage is often taken of the broad creek valleys, to secure an easy grade, and give an outlet to the fertile bottoms and hillsides. Convenient access to most of the high land, however, is gained by locating the roads on the various ridges that slope towards the river. Here were constructed the principal thoroughfares across these and adjoining counties, and here sprang up many small towns, as Yorkville, Mooreshill, and Dillsborough. When the railroads were afterwards made across Dearborn county, with an ascent of 500 feet, an easier grade was required; and to gain this, the valleys of the Tanner's and South Hogan creeks were selected. Much of the travel was thus diverted from the ridge roads, town property ceased to increase in value, or even depreciated; and in one village there is now no tavern where two were once supported.

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†The elevation of this point above the river at Vevay is 304 feet, as obtained by Mr. C. G. Boerner, to whom I am indebted, also, for other assistance.

I can not leave this topic without a remark upon the character of the scenery, which indeed is a very important geological feature. The blue limestone region presents no perpendicular cliffs.\* Cataracts also are incompatible with the nature of the rock. Where the ground is uneven, the hills are beautifully rounded, the ridges gracefully sloping to the bottoms, or marked by "saddle-backs." There is no grandeur in the view to fill the mind with awe, but there is a tranquil beauty in the contour of hill and valley, there is a certain loveliness in the aspect of the river, slumbering on the bosom of the rich alluvial terraces, that inspires the mind with thoughts of peace and rest. Even where the ground becomes more level, a vista of four or five miles may be enjoyed from favored spots.

#### STREAMS AND WATER POWER.

Each county fronts on the Ohio river, and is drained by the tributaries of that stream. The Miami river touches the southeast corner of Dearborn county, and the White-water flows through the northeast part. Tanner's creek empties into the Ohio near Lawrenceburg. North and South Hogan creeks unite in Aurora, near their mouth. Laughery creek flows southward through Ripley county, then southeast, forming the boundary between Dearborn and Ohio counties. The streams of Switzerland county are comparatively small; the principal are Grant's, Bryant's, Log Lick, and Indian creeks.

These streams give efficient drainage (usually towards the southeast) except in some parts of the upland flats and a few spots on the terraces. The valley of Laughery creek, divides our district into two natural divisions, as a study of the topography shows; for the flood of 1847, reached a point five or six miles from Ripley county.

The great amount of fall in many of the streams, early suggested the value of the water power, which has been utilized in many places. The flow of water, however, is so

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\*One exception is noted in chap. i.

uncertain, that many of the mills can run but part of the year; and as this difficulty has increased, many of them have been abandoned. There is abundant testimony that the summer streams are less constant now than they were some years ago. This change may be attributed to clearing the wet highlands and their more speedy drainage in the spring, rather than to an actual change in the climate. Since the fields have been cleared and plowed, also, much of the water is absorbed by the soil and given up again by evaporation, that would otherwise have flowed off to the creeks.

#### RISE AND FALL OF THE OHIO RIVER.

The annual floods of this stream are subject to great range of variation, both in the amount of rise and the time of year at which the maximum is reached. The record kept at Cincinnati Water Works for the years 1859 to 1871, inclusive, shows that the highest water for the several years has occurred in each of the winter and spring months, and the lowest water in each of the summer and fall months except June. The water in the channel has fallen, in each of these years, as low as five feet eight inches, and has risen as high as forty feet six inches. The river stood at two feet four inches, Nov. 1, 1862. Two feet six inches is called "low water mark." The most remarkable floods of which we have definite records, occurred in February, 1832 and December, 1847. These floods were sixty-two feet above low water, and the level then reached is generally called high water mark. Floods of 1792 and 1815, are supposed to have been about five feet lower.\* The highest stage of the river since 1848, was fifty-five feet above low water, reached in January, 1862. The highest floods of this century have thus occurred at intervals of fifteen and seventeen years. If such a periodicity is established by a longer series of observations, it must indicate the recurrence of climatic conditions, favorable for an accumulation of water at one time.

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\*See Howe's *Historical Collections of Ohio*, p. 224.

## SPRINGS AND WELLS.

Good springs are abundant in nearly all parts of this district. Water is generally found in wells at a depth of fifteen to thirty feet. Both spring and well waters are hard from the underlying limestone. Comparatively soft water occurs in the upland drift, as at Milan, Ripley county, and this is preferred for locomotive engines.

Several farmers assert that the number of good springs has increased since these counties were first settled.

There are two springs that have some reputation for alleged medicinal properties. One of these, belonging to Lazarus Cheek, is one-fourth of a mile northeast of Aurora. The water is clear, slightly effervescent, and smells strongly in summer of sulphuretted hydrogen. It is recommended as a tonic, purgative and diuretic. The water issues from the base of the hill, close to the river bottom, and seems to proceed from the native marl, which abounds at this place almost to the exclusion of limestone. A cistern near by was so affected by sulphur water as to be useless. In Switzerland county, almost in the bed of Grant's creek, a few miles from its mouth, is another spring of some repute for supposed medicinal virtue. This water also smells strongly of sulphuretted hydrogen, and I am told that the gas emitted will burn about a minufe if a lighted match is held near. Whether the reputed value of these springs is real or imaginary, I leave for the consideration of the medical profession.

Several other springs, tainted with sulphur and disagreeable salts, occur on the high land as well as low land.

A well was sunk at Aurora by Messrs. Gaff & Baughman, through—

Gravel, sand and clay, about.....	90 ft.
Blue limestone and clay, about.....	130 ft.
<hr/>	
Total.....	220 ft.

It is stated that at 160 to 170 feet down, a vein of salt water was found, the quantity of brine, however, being too

small for economic purposes. Mr. Drayton's analysis gives, from eight ounces of water:

Salt.....	115 grains.
Lime.....	2 grains..
Sulphur and magnesia.....	2 grains.
<hr/>	
Total.....	119 grains.

This is equivalent to about three per cent. of solid matter, but as the brine was diluted with water used in working the diamond drill, the pure brine may have been stronger.

A dozen or two salt licks and brackish wells have been noted, chiefly on low ground, near the principal creeks. The manufacture of salt will be referred to in the chapter on economical geology.

Near Laughery creek and elsewhere are a few springs tinged with iron; some have an oily scum, which is sometimes mistaken for a sign of petroleum.

## CHAPTER II. DESCRIPTIVE GEOLOGY.

### GEOLOGICAL FORMATIONS.

The prevailing rocks are Lower Silurian. The Upper Silurian deposits occupy small areas in the northwest parts of Dearborn and Switzerland counties. The dip is hardly appreciable, except in the western part. There is drift on the uplands, and the river terraces consist of modified drift.

#### LOWER SILURIAN.

These rocks form part of the "Cincinnati uplift." Their usual character has already been described in Dr. Haymond's report on Franklin county, and in the Geological Reports of Ohio. In almost any of the quarries, or escarpments of rock, the blue limestone is seen interstratified with blue marl or clay. The proportion of limestone varies with the locality, but usually not more than one-third the whole bulk is suitable for economic purposes.

The limestone seldom occurs in layers of more than eight inches. There is an apparent layer of sixteen inches in the Lawrenceburg quarry, but it is separated into two or three by partings of clay. Neither does the marl occur in uninterrupted beds of any great thickness. Near Rising Sun there is an exposure of twenty feet, or more, of blue clay, with no limestone more than an inch or two thick: but even here, there is a very thin layer of solid rock at every foot or few inches. The blue limestone is broken by vertical joints at intervals of a few feet or less. The largest piece observed was at Vevay, about ten by six feet. The pieces often approximate to the parallelogram in shape; sometimes this feature is very striking, where the layer is divided into bits by two sets of nearly parallel joints, not running at right angles. A weathered stone often exhibits very narrow parallel grooves on the upper surface. By breaking the specimen they are seen to extend through one-fourth, more or less, of its thickness.

A peculiar form of rock is seen in certain layers whose under surface is almost plain but the upper surface is waved, being crossed by gently curved ridges, two or three feet apart. There is a fine exhibition of this peculiarity near the junction of Bain's branch with Grant's creek, Switzerland county. The layer is 6 inches thick at a ridge, and  $1\frac{1}{2}$  to  $3\frac{1}{2}$  inches at the depression, being thinnest where the ridges are furthest apart. The overlying stratum of marl fills the space between the ridges, and the next layer of rock is as even as usual. The arrangement of the ridges may be compared to that of a honeycomb in an old fashioned bee-hive. Where one ridge terminates, those adjoining on each side approach each other until the usual distance is restored.

Compact concretions, or mudstones of oblate form, are common in the shale, being most numerous with certain layers.

The freshly quarried rock has a pale blue color and somewhat crystalline fracture. It is usually fossiliferous, and when made up of large shells it often has too open a texture

to withstand the action of the weather. Water penetrates the stone, disintegration begins and irregular partings appear. Some layers are more compact and almost destitute of fossils. These are of a deeper color if freshly quarried, but both kinds, by exposure, become a whitish-gray on the surface. Iron pyrites occur in one or two layers of solid limestone in some localities, and is sometimes mistaken for an indication of gold. Most of the limestone is firm and durable but can not be dressed to a handsome surface. The blue clay is fine-grained and easily cut with a knife; it has a shaly cleavage in the direction of the layers. A smooth or freshly cut surface, when held in the sunshine, shows a beautiful iridescence. It crumbles or "slacks" on exposure and soon produces a fertile soil. Yellow clay takes the place of the blue in the upper part of the series.

The following analysis is from the Ohio Geological Report for 1870, page 460.

BLUE LIMESTONE MARL, WAYNESVILLE, OHIO.

Silicious matter.....	69.60
Alumina and sesqui-oxide of iron.....	10.24
Carbonate of lime.....	12.55
Carbonate of magnesia.....	1.91
Potash and soda.....	5.40
Phosphoric acid.....	0.16
Total .....	99.86

At the quarries near St. Leon, Dearborn county, in the upper part of the series, the rock is compact and bears hammer dressing much better than the average rock of this formation. On exposure it becomes gray. This change begins at the surface, and gradually reaches the center. While this is in progress, the two colors are not blended, but the gray and the blue remain very distinct.

Some peculiarities in lithological structure occur in the Log Lick and East Enterprise turnpike cuts according to the following section :

- |        |  |        |
|--------|--|--------|
| No. 1. | Fossiliferous blue limestone and clay.....                       | 10 ft. |
| No. 2. | Compact gray and blue limestone and clay...                      | 11 ft. |
| No. 3. | Compact, in small pieces, limestone and clay..                   | 6 ft.  |
| No. 4. | Fossiliferous blue limestone and clay of usual<br>character..... | .....  |

No. 1 includes little that is unusual.

No. 2 resembles the rock near St. Leon. It is gray near the surface, and dark blue at the center. One layer consisted of long pointed pieces, about one foot by six feet, with clay between in the same layer.

The layers of stone in No. 3 consists of pieces from two to eight inches in diameter, set close together. The larger pieces break without showing a fresh surface, and scarcely a sharp corner.

No. 4 extends, probably, to the level of the river. The top of the section is four hundred and forty feet above low water. The absence of *Rhynchonella increbescens*, *Strep-talasma* and *Petraia corniculum* seems to indicate that these rocks are not at the top of the series.

Another peculiar form is seen in certain heavy layers of limestone exposed near the Ohio river opposite Carrollton. Beginning about two hundred and fifty feet above low water mark, we have the following section of rock without the usual joints and almost destitute of the marl that is elsewhere interstratified with the limestone:

- |        |   |              |
|--------|---|--------------|
| No. 1. | Hard limestone, weathered so as to<br>show numerous layers.....             | 4 ft. 0 in.  |
| No. 2. | Harder limestone, in places showing no<br>further division into layers..... | 4 ft. 6 in.  |
| No. 3. | Like No. 1.....   | 10 ft. 8 in. |
| No. 4. | Like No. 2.....   | 4 ft. 4 in.  |
| No. 5. | Like No. 1.....   | 5 ft. 0 in.  |

Nos. 2 and 4 sometimes form overhanging ledges.

Calcareous tufa, inclosing recent *Helices*, is formed in the cavern. These beds may be traced two or three miles on the south face of the hills. Large masses that have rolled down the hillside show that the rock is very firm. The



position of these rocks, and their fossils induce me to consider them Lower Silurian, in spite of their anomalous lithological character.

Among the lowest Lower Silurian rocks exposed are layers of compact stone of comparatively dark color and abounding in fossils. This rock crops out in Millersburg, one mile from Florence, and at other points on the river. The stone is quarried nearly opposite Rising Sun, at low water, and used for tombstones under the name of "Kentucky marble." It receives a beautiful polish, when the fossils are very distinct; some dull spots probably indicate the position of concretions through the rock. Small cavities lined with calc spar sometimes occur and small crystals of iron pyrites are frequent. Slabs are quarried as large as desired.

In different parts of the series, thin layers occur which have a sand-like texture and a rusty or brown color. Some specimens are almost as fissile as shale, and are found adhering to the usual form of limestone.

In the railroad cut above Weisburg there is an exposure of about ten feet of loose yellow sandy material. This bed contains one ten-inch layer that is pale, blue and pretty firm in the center, but is yellow and crumbling near the upper and lower surfaces. Other thin layers occur similar to the upper and lower parts of the one just described, besides one-half inch of crystalline blue limestone. Some clayey layers also occur. This is equivalent to the rocks described as the upper beds of the Cincinnati group in the Ohio Geological Reports for 1869, page 147, and 1870, page 267, and by Prof. E. Orton, provisionally regarded as equivalent to the Medina sandstone of New York. (Ohio Geological Report for 1870, page 268.) Some of the wells near Weisburg show a blue rock of sandy texture, easily cut with a knife, which is probably the same deposit, unchanged by the decomposing action of frost, air and water. Similar rock is found in wells in Ripley county, northwest of Dillsborough, and in the northwest part of Switzerland county, also in the quarry of Mr Hotchkiss, near Bennington, who has shown

it to possess hydraulic properties. The *Favistella stellata* (which, according to Prof. Owen, marks the upper limit of the Lower Silurian) was not found in the section at Weisburg, but occurred one or two miles south of Mr. Hotchkiss' quarry at a somewhat lower level.

Nearly all parts of this series abound in fossils, but only the lower order of animals and plants are represented. Specimens from various localities have been sent to the State Geologist for identification. By studying these relics we learn that during the ages that were occupied in building up this formation, many changes occurred in the life of the ocean-world. The thimble trilobite (*Trinucleus concentricus*) abounded in the earlier part of this age, but was afterward very rare. The star coral, (*Constellaria stellata*), and other fossils, are confined to certain horizons, while the upper fossiliferous beds are distinctly marked by the *Rhynchonella increbescens* and *Streptoplasma corniculum*. Numerous parasites flourished, as the *Tentaculites flexuosa*.

The exact equivalent of these rocks with those of New York is hard to determine. We have many fossils that are catalogued by Professor Hall, some as characteristic of the Trenton, and others of the Hudson period. Some of the species seem to have a wider range here than is indicated in the New York Reports.

#### UPPER SILURIAN.

The characteristic fossils are the safest means of distinguishing the several periods of geological history, but well preserved specimens are so rare in the Upper Silurian rocks of Dearborn and Switzerland counties that I was compelled to rely upon the lithological character and the position of the strata to distinguish them from the rocks below. This formation does not appear in Ohio county, but overlies the Lower Silurian in two small areas which are separated from each other by the valley of Laughery creek.

There are good exposures of the weathered rock between Weisburg and Van Wedden Station. Some firm layers occur one foot or more in thickness. Intermediate with these are softer limestone and shales.

The exposures in Ripley county, on the Ohio & Mississippi Railroad, between Laughery creek and Osgood, show the same general character. One layer of 21 inches is there quarried; but where the heavier layers crop out, they generally weather so as to disclose one or more partings. The *Favistella* occurs below these rocks. Near the top of the section, within a mile of Osgood, the limestone and shale have all the lithological characters usually seen in the Lower Silurian, and contain *Orthis Lynx*, *Streptoplasma corniculum*, and other fossils. Further west are quarries of bluish stone, buff on the surface, and similar to the rock shipped from Laurel, Franklin county.

Mr. Hotchkiss' quarry near Bennington, Switzerland county, shows several thick layers of limestone, separated by layers of clay not more than three inches thick. The stone is often gray, but the deep blue color in the quarried stone as well as the gray of weathered specimens, are sometimes more decided than in the Lower Silurian. There are several outcrops in Switzerland county of a very hard buff limestone, containing crystals of calc spar. This layer is several feet thick. It contains *Orthis Lynx*, *Strophomena depressa*, *S. filitexta*, and a few other fossils, and is probably the highest layer in the county, but may be entirely local.

*Tetradium* and *Favistella* are exposed by a small creek in Ripley county, southeast quarter of section 32, township 6, range 12 east.

#### POST TERTIARY.

There are no deposits that have been indentified as belonging to this period, but the bones of extinct animals have been found at several places imbedded in clay or gravel. These generally occur in the low land bordering the Ohio River or large creeks, and in some cases are clearly in the drift, being exposed by the gradual wear of the river bank. The following is a list of the instances:

Mastodon and Mammoth. Part of a pelvis was found at a salt spring on Tanner's creek below Guilford, and a tusk on Laughery creek above Hartford. A tooth was found at

Rising Sun, in the river bank. A piece of a femur and other fragments were taken from a gravel bank at the mouth of Grant's creek. Mr. M. R. Green, near Patriot, informs me that a piece of tusk five or six feet long, somewhat curved, and about six inches in diameter, was found in the river bank near his house. A Mastodon tusk, fourteen feet long, was found in the river bottom, five miles below Vevay. A Mastodon tooth was found on high ground on George Randall's farm, five miles west-southwest from Aurora. It was lying on a stratum of bluish clay, eight or nine feet from the surface.

Dr. Lutton, of Aurora, has a skull of the large black bear, found in clay at Aurora. He has also a bone that closely resembles that of the Irish Elk. Dr. J. W. Baxter, of Vevay, says that the bones of a sloth were found in the drift above the mouth of Bryant's creek. These bones and teeth are nowhere so abundant in my Geological district as on Big Bone creek, Ky., where they are imbedded in stiff clay and well preserved.

Our study of these remains is rendered difficult by the scarcity and fragmentary character of specimens. Whenever indications are seen of a good specimen, the greatest care should be taken not to disturb it until everything is in readiness to do the work thoroughly; then every piece should be carefully removed, cleaned, and subjected to some process to preserve it from the disintegration that very speedily ensues if the bone is exposed to the air without this precaution.

#### DRIFT.

There is more or less drift on nearly all the high land. Northwest of Manchester, at Fairview, and in other parts of the upland flats, the limestone is overlaid with unstratified blue clay, containing pebbles and bowlders, many of which bear glacial scratches. The impervious nature of this clay determines, to a great extent, the agricultural character of the "crawfish flats." Much of the drift has been removed by erosion from the broken upland, but even

on the hills, some pebbles are found (occasionally scratched) which must be referred to this source. Boulders are common in each of the counties, some of them three or four feet in diameter.

An interesting specimen, found near Tanner's creek below Weisburg, was a piece of native copper, weighing twenty-six ounces, which must have been brought by natural agencies from the Lake Superior region.

An unusual amount of pebbly drift occurs on the hills near Florence, and at the base is a mass of clay mingled with pebbles, on which no scratches were observed.

At Hartford, there is a remarkable accumulation of drift, chiefly resting against the north face of the native hill. Between the bottoms of Laughery creek, and the hilltop, the deposit is about two hundred feet high, with a beautiful grassy surface, divided by narrow dells. An outcrop through the soil shows nothing but cemented gravel. Time has been wasted here in searching for lead. Sand, with some cemented layers, was found near the top. At the base are slabs of blue and gray limestone, mingled with clay, a variety of pebbles, and flattened ferruginous concretions, which consist of concentric layers or are hollow. A trilobite (*Calymene*) with the form and markings uninjured was here associated with scratched pebbles. In one of the prospect holes there is about twelve feet of quicksand in a basin of native rock. Large crystalline boulders abound south and southwest of Hartford, occupying a space one mile east and west by one-fourth mile north and south, in a valley that opens towards Laughery creek. Two or three small streams flow northward across this valley to the creek.

Chemical changes have taken place in the material of the drift, since it was deposited. Cemented gravel occurs at Hartford and was found in a well near Van Wedden's Station. Split Rock, Ky., is thoroughly cemented by lime and the same change has taken place in many parts of the river terraces. The bog ore described under economical geology, is deposited from the waters of ferruginous springs. A similar substance, but whiter and of limited extent, occurs

in the "crawfish soil" near East Enterprise, and in a clay terrace near Hickman's Landing. Small hard smooth ferruginous nodules occur in parts of the upland flats, where they are said to dull the plow. Brittle concretions, one to three inches in diameter, similar to those at Hartford already described, occur on broken upland one mile west of New Alsace. Radiating crystals of carbonate of lime, almost transparent, but stained to a pale yellow, occur at Hartford, at the base of the drift, adhering to gravel and to limestone.

A phenomenon of interest, but quite local, is the occurrence of vegetable remains in the drift. Mr. N. Van Osdel gave me the following section of his well, in the broken upland of Ohio county, northwest quarter section, 6, township 3, range 2 west:

Soil and clay .....	22 ft. 0 in.
Yellow sand, quite hard or cemented..	9 ft. 0 in.
Blue clay, quite hard, without pebbles.	1 ft. 6 in.
Rotten leaves, twigs, black soil, wood (believed to be walnut), and thick bark.....	1 ft. 6 in.
Coarse sand, gravel and shelly stone...	9 ft. 0 in.
Hard blue limestone.....	1 ft. 0 in.
	<hr/>
	44 ft. 6 in.

Similar deposits occur on gently rolling upland, in the northwest part of Switzerland county. The most interesting of these is at Mr. J. B. Gordon's, in section 4, township 5, range 12 east. The section as described to me is as follows:

Soil, clay, etc., more whitish at the lower part.....	22 ft. 0 in.
Blue mud, resembling recent alluvium	6 ft. 0 in.
Black soil containing leaves, cedar wood and ochreous particles.....	3 ft. 0 in.
Small stones packed together like a Macadamized road.....	1 ft. 0 in.
	<hr/>
	32 ft. 0 in.

The bottom layer would be called "rotten limestone," if found in a quarry, and is probably native rock. Several wells in the vicinity are said to have furnished specimens of wood, etc., and one near Aaron Postoffice, some leaves and poplar bark at a depth of 32 feet.

West of the ridge on which Mr. Gordon lives, the rock is much nearer the surface than it is on the east. At a depth of 10 to 14 feet in the well, ledges of rock were projecting on the west side only, while no rock was found in the old well 25 feet further east. These ledges are of a sandy texture, and yellow except a narrow blue portion at the center. They closely resemble a layer, already described, from the Weisburg section, and like it, have probably been peroxidized. Buried vegetation is found in Highland county, Ohio, and many other places. That disclosed in these wells may be of similar origin.

Modified drift is described in the next article.

#### RIVER TERRACES.

The Ohio river, its bed, and the adjoining lowlands, have been the subject of very interesting changes, especially as the agencies are still in operation, producing results that can be observed from year to year. The Ohio, as proved by borings at several points, "runs in a valley which has been cut nowhere less than 150 feet below the present river." [See Ohio Geological Report for 1869, p. 26.] The many tributaries have since brought down gravel, sand, clay and mud, thus filling up the valley to the present level of the river bed and the adjoining lowlands. The source of this deposit is to be found in the several formations, including drift, over which the river and its affluents have flowed. The deposit, or at least the upper part, exhibits a stratified arrangement, and is called modified drift.

Let us first consider the surface features. The river flowing from one side of this area of lowland to the other, is even more winding than the valley of erosion prepared for it. The bottoms extend on both sides of the river, except at intervals where the water strikes the native Silurian rock

and is deflected in the opposite direction. The aggregate width of the river and lowlands, within the district we are considering, is usually from one and a half to two miles.

The lowland generally consists of a series of terraces,\* rising from the river to the hillside, of native limestone; and the whole area varies in width at every mile as the river passes toward either shore. The terraces vary in number, height, and slope, conforming to no apparent law. For convenience, they may be classed as high and low terraces, and gravelly knolls. No correspondence is observed in the height of the terraces on the opposite sides of the river. More than half of this lowland area is included in the high terraces, which rise above high water. The surface may be gently rolling, and is often divided by a low water shed parallel with the river, the greater part being drained toward the hill, at the base of which is the channel of a wet-weather stream. The greater part of the low terraces are subject to overflow in time of the highest floods. They often slope toward the river, and under favorable circumstances those which are subject to frequent overflow receive an additional deposit of rich alluvium.

Low terraces sometimes occupy nearly the whole space from the river to the hillsides; for example, at the mouth of Plum creek and the first mile below; at Florence, and at the mouth of Bryant's creek, and the first mile above. In the first instance, the high terrace lies on the west, separated by a well marked bench, while the low terrace is reduced in width to a few rods, and entirely disappears below the warehouse at Vevay. The same features are presented at Florence, most of the area between the lower part of Log Lick creek and the Ohio being occupied by high terraces. The low terraces at the mouth of Bryant's creek extend west to a point where the river strikes the native rock, but are reduced to a very narrow strip on the east, where they are bounded by high terraces. Such variations, as well as others, may be noted throughout the river portion of the

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\*The river bottoms are all included in this term..



district we are considering. At one place, a terrace presents an unbroken surface of gentle and uniform slope. Either above or below, the surface may separate into two or more terraces, one being from two to twenty feet higher than the other. A terrace may have a gradual slope in the same direction as the river current, or in the opposite direction. I have seen no instances of such regularity as represented in the view of the Connecticut river terrace in Dana's *Manual of Geology*.

At or near the base of the limestone hillsides, gravelly or sandy knolls and ridges occur at certain places. These are higher than any of the terraces described, and present a more uneven surface. Examples will be seen north of Rising Sun, and near the mouth of Plum creek.

If we observe the material of which these deposits consist, we find a great variety; limestones, sandstones and shales are mingled with various crystalline rocks. All kinds of rocks that are common in the Ohio valley are here represented. Fair specimens of certain corals sometimes occur. Coarse and fine sands are interstratified with gravel, sometimes with clay. The gravel beds are often cemented where they are exposed or near the surface. It is noticeable, also, that the higher terraces are older, and consist of coarser material than the lower ones.\* This is seen where a section of a high terrace and adjoining low terrace are exposed together, as at Vevay. Five to fifteen feet near the surface is generally sandy, resulting in part from the decomposition of coarser material. With this exception, the high terrace contains coarse gravel and boulders through the whole depth as far as exposed, while the low terrace at the same level contains finer material only. The lowest terraces consist of the very fine loam deposited by recent floods.

While a half dozen terraces can be distinguished on some parts of the Ohio, its tributaries do not exhibit so many. Two are distinctly marked on parts of Laughery, Hogan

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\*For this observation and other aid in studying this subject, I am indebted to Hitchcock's "Illustrations of Surface Geology."

and Indian creeks. The larger creek channels have been eroded much deeper than their present level, and have since been filled by material brought down by the several streams, chiefly a whitish clay, with traces of stratification. A well near Laughery creek, (two and a half miles from its mouth) disclosed a bed of water-bearing sand at a depth of forty-seven feet.

Other materials than those described occur in this formation. At Lawrenceburg, exposed only at low water, is a bed of blue clay, containing abundant remains of leaves and logs.\* The fruit of the buckeye, beech, hickory and buttonwood were recognized. This deposit of organic remains was found also in a Lawrenceburg well. Limbs and pieces of wood imbedded in blue clay were found in a well at Aurora. An excellent exposure of similar character occurs at Hickman's Landing, Switzerland county, two miles above Florence. A bed of blue clay containing leaves and wood, four and a half feet thick, may be traced in the river bank without interruption for twenty rods, and appears at points above and below. Both here and at Lawrenceburg there are ochreous deposits of sand or gravel above and below the clay. At Hickman's Landing these layers are usually cemented, and some thin layers of similar character are interstratified with the clay. The greater part of this terrace (which slopes towards Sand Run) was covered by the floods of 1832 and 1847. At a point near the river, about four feet above those floods, a well was dug reaching the bed described, showing that this is not a recent deposit upon the shore, but it must be older than the terrace which contains it. Another boring disclosed the bed more than a quarter of a mile from the river. Some antiquarian remains now form part of the terraces. In the river bottom, below the mouth of Laughery creek, are the remains of ancient fireplaces. One of these disclosed by the wearing away of the bank was thirteen feet below the surface of the river bottom. Deposits of mussel shells are exposed in the banks

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\* This was pointed out to me in 1871, by Prof. E. Orton, of Ohio.

near Florence, from three to ten feet from the surface. These point out the presence of man while those terraces were forming.

Having thus described the present condition of this formation, it will be necessary to study the changes that are now in progress, before framing any theory of geological history. The chief agent is the river itself, now rushing down with a flood of water fifty feet deep, and a few months hence gently flowing with but three or four feet in the channel. Here the current strikes the loose gravel or sand of the bank, and the wind drives the waves against the shore; there the swollen waters have spread beyond their banks, the current is arrested in a shallow place, and particles of fine sand and clay, leaves and vegetable mould, are deposited to enrich the bottom, or to help form a new terrace. In certain places large portions of either high or low terraces become undermined and slip into the water. The united action of frost and wind carry on the same work of destruction. Elsewhere the farmers are extending their cornfields where the waters formerly flowed.

A few examples of these changes will be given: At Rising Sun it is estimated that no less than three hundred feet of the bank has been washed away within twenty-five years. A row of houses has disappeared which once stood above Main street, with road and play-ground beyond. The well referred to, at Hickman's Landing, was dug about one hundred feet from the bank, but it has been carried away and much of the bottom behind it. At Florence there was but little wear twenty-five years ago, the bank being protected by trees. About eighty feet of the bank have been lost at the Main street within a few years, and two hundred feet a short distance below. Repeated changes of the river road have been required in many places.

The process of land making is also very common, but I judge that the amount of material deposited will by no means equal the amount removed. There was formerly a low island above Vevay, close to the Indiana shore. Steamboats ascending the river frequently passed through the

chute, twenty years ago. The steamer Kentucky went through as late as 1859. A few tow-heads were gradually formed about the upper end. The current was thus arrested and the fine material held in suspension was deposited. When this accumulation had so filled the chute that the island was connected with the main land at low water it became part of Indiana; another corn field has been added to the agricultural wealth of the State. A stump, which was at the water's edge in 1850, to which the fisherman fastened his net, is now several rods from the bank. Land is still forming among the trees beyond and below the island. Similar deposits are generally forming wherever a growth of willows or other trees is secured sufficient to diminish the current in time of overflows. Sometimes, however, the exposed roots of trees indicate that they are not a certain preventive of erosion. The current may be even wearing the bottom at one point while depositing silt immediately beyond. For practical suggestions on the protection of river property, see the chapter on Agricultural Geology.

Let us now consider what hypotheses will most readily account for the observed facts. We will assume, with most geologists, that the drift phenomena prove a "glacial period," when the continent was raised far above its present level. This period preceded the formation of the terraces; beside other proof, this is indicated by the variety of the material, for the terraces contain crystalline boulders from the drift as well as sedimentary rocks that are native in the Ohio valley. During the elevation of the continent, the erosive power of the Ohio and its tributaries would be augmented by the increased amount of fall in the streams. This easily accounts for the wear of the rock formations to the depth required below the present river bed.

During the "Champlain Epoch" which followed, the continent subsided, the force of the current diminished, and the coarse material brought down by the stream was deposited. This process must have continued till the highest parts of the present terraces were reached by the flood. The creeks, meanwhile, left a deposit of clay from the Silurian hillsides.

The terraces have not yet been accounted for. The river bed is now far below its former level, and we must call to our aid one more period of continental rise to explain the erosion that followed the Champlain Epoch. Whether this part of the continent is still rising has not been determined by historic data, but we have seen that the "Terrace Epoch" is not yet at an end. Partly by the erosion of the river at certain places while deposits were forming at others, and partly by the agency of tributaries, the ever changing series of terraces may be accounted for. The height at any point will depend simply upon the amount of erosion and the depth of deposit. As already noticed, the high terrace has entirely disappeared near the mouth of several of the creeks. The material that has been worked over and re-deposited is finer than that of the original formation, as noted at Vevay; but we may not always be able to determine whether a certain bottom should be referred to this epoch, or to a denuded part of the original deposit. During this epoch or the preceding, soil was formed, and various trees flourished such as are now common in temperate regions. These remains are not found through the whole deposit, because either their growth or the conditions for preserving them were local; but it will be observed that the deposit at Lawrenceburg is twenty or thirty feet below that at Hickman's Landing, and could not have been made at the same time. The antiquity of the vegetable remains in these instances is argued from the overlying deposit. That at Hickman's Landing was made at a time when not only could the river rise four feet higher than the greatest floods of historic times, but the circumstances were favorable for the formation of river bottom at this height. Wood and leaves are still buried every year by the alluvium, and may be unearthed in the future. The old channel at Vevay island is now occupied by a pile of drift-wood. By the operations now in progress, this may be completely covered and preserved. A future race, digging a well on the river bottom, may find the same phenomena that interested us ten miles above.

Professor Hitchcock's conclusion, drawn from the study of terraces elsewhere, is equally applicable here. The successive terraces, he says, "may be found by the simple drainage of the country, as the surface emerges from the ocean. Nor need we, as has generally been thought necessary, suppose that there were pauses in the vertical movement."

(Illustration of Surface Geology, p. 58.)

#### RECENT GEOLOGICAL CHANGES.

The line between geological and historical times can not always be distinguished; the "Terrace Epoch," as we have seen, includes the present time. Whenever a flood washes the soil from the hillside, or tears up the stone from the brook, the process of erosion is in progress. The frost, the rain, sunshine and plant-growth, still carry on the work of soil-making, just as in prehistoric time. The calcareous tufa of Switzerland county, while regarded as a recent formation, is governed by the law of chemical geology.

Another interesting phenomenon is the formation of sink-holes. These are most abundant in the soils overlying the Upper Silurian rocks, or the upper part of the Lower Silurian, where the water sinking through the soil wears away a channel by dissolving the rock, and the soil, no longer supported, falls in. A very common form is that of an inverted hollow cone. This may increase, if the water is allowed to wash down more and more of the soil to the channel below, but if it becomes sodded over, (especially when filled with brush or rubbish), the wash may be arrested, and the sink be converted into a pond, and gradually filled up.

When the surface soil is matted together by the roots of grass, it will keep its place long after the cavity has begun to form, until finally some horse puts his hoof upon the fragile roofing, and a cavity is revealed large enough to hide the whole animal. The next year the hole may be filled.

A series of sink-holes sometimes points out the vein of water, when a well is to be sunk, or an opening in a layer of rock, when a quarry is to be opened.

A common phenomenon is the land-slip, especially on the steep river hills. The clay, being wet with spring rains, becomes slippery and too soft to support the weight above. Part of the hillside slips down by its own weight, forming a bench where the material accumulates. A greater depth of soil is retained on the benches than on the steeper part of the slope.

#### ANTIQUITIES.

Dr. G. Sutton, of Aurora, kindly promised to furnish an account of the antiquities of Dearborn county, and these will not be considered in this article.

Artificial mounds, as well as darts and other implements, are numerous in Ohio and Switzerland counties, near the Ohio river and Laughery creek. They are often associated with burial places, either in the bottom or on commanding eminences. I have found no mounds on the upland flats, though other relics sometimes occur, as a beautiful heart-shaped ornament of Huronian shale, found near Bennington.

Dr. J. W. Baxter, of Vevay, gives me the following account of a series of mounds or signal stations, occupying prominent points along the Ohio river, and so located that each may be seen from the next above and below. These command nearly the whole bottom. From the station below Patriot the observer may look across Gallatin county, Kentucky, and the valley of Eagle creek to the high of land in Owen county. Both this mound and one near Rising Sun exhibit traces of fires that were doubtless used as telegraphic signals by the Mound Builders. The mounds at the following places form a complete series, though others may have been used when the country was timbered :

Rising Sun.

Near Gunpowder creek, Kentucky.

The Dibble Farm, two miles south of Patriot.

The "North Hill," below Warsaw, Kentucky.

The Taylor Farm, below Log Lick creek.

Opposite Carrollton, Kentucky.

Below Carrollton.

A greater number of wild grapes, plums, crabapples and onions are found near the mounds than elsewhere.

Dr. Baxter refers these relics to the same race as the natives of Central America, from the similarity of hieroglyphics on pottery found near Warsaw, and from the features of a face carved in sandstone from the same locality.

The fireplaces, near the mouth of Laughery creek, have been mentioned in describing the river terraces. These are disclosed from time to time as the river wears the bank. Dr. Grant, of Kentucky, told me he had known at least eight. The one I examined consisted of a layer of boulders 13 feet from the surface. The part exposed was 3 feet across. Pieces of charcoal, soft and crumbling, were found among and under the boulders, while other pieces, that had fallen out and dried in the sunshine, were firm. The clay under the boulders was red as though burnt. No one could examine the section without being convinced of human agency in the work.

In the river bank, opposite Florence, there is a layer of decomposing mussel shells, thirty-two inches from the surface. The outcrop now extends forty feet, and was noticed as early as 1847, when the bank stood two or three rods further towards the channel than it now does. This deposit seems to be entirely local, though extending over several square rods. The shells include *Unios*, such as are still common in the river, and are so far decomposed that the laminated structure is plainly marked, as in shells that have been burnt. Similar deposits have been observed elsewhere in the terraces.

## CHAPTER III.—ECONOMIC GEOLOGY.

### BUILDING STONE.

The blue limestone is everywhere abundant, and is well adapted for foundations, cellar walls and other rough masonry. Very little of it will bear dressing. Houses made of this stone may be substantial, but are not handsome; they be-



come discolored with age, and sometimes stained with iron; stones of coarse texture weather badly. Few quarries are extensively worked, because the stone may be picked up from every creek, or dug out of almost every hillside. This limestone is less liable, than the Cliff, to split and fall to pieces under the action of fire. J. R. Kilner, of Lawrenceburg, pointed out an illustration of this fact in the foundation of an old warehouse near the I. C. & L. depot. The building was burnt, with about one hundred tons of hay and many thousand empty barrels, but the rock foundations suffered little injury. Large slabs of compact stone are selected for fireplaces, and last fifty or sixty years. The smaller stones are much used for Macadamizing roads where gravel can not be obtained.

The so-called "Kentucky marble," used for monuments, has been described.

Quarries near St. Leon and Weisburg furnish a superior stone, approaching that of the Upper Silurian in color and compactness. This stone resembles that of Schrichte's quarry, near Brookville, described in the Report for 1869, p. 181.

The Upper Silurian quarry of George A. Hotchkiss, near Bennington, furnishes excellent building stone, which was used in the jail at Vevay. A difference is observed among the several parts of the quarry: the stone from one layer having been tested for nearly twenty years is scarcely affected by exposure. The stone is grey on the surface, but is often of a dark blue color when broken. It is compact, and contains few fossils. A similar stone occurs in Dearborn county, one mile south southwest of Mooreshill, and is quarried near Elrod, Ripley county. Both these localities furnished stone for the bridges of the Ohio & Mississippi Railroad.

#### LIME.

Lime is burned for home consumption, in temporary kilns or in "log heaps." If the latter method is selected, the stone is laid on a pile of logs (the large pieces being

broken) and burned about one day. When the fuel is exhausted, although the stone is not all thoroughly burnt, some good lime is made. This method requires several times the quantity of wood needed in the kiln, and is now more seldom resorted to, since timber has become less abundant. There are no perpetual kilns. The blue limestone from the surface or the creeks is generally used. This makes a dark colored but strong lime, well suited for mortar, though it will not answer for the skim, or for whitewashing. The same kind of lime is used by soap manufacturers in Cincinnati to prepare the caustic lye. The dark blue compact layers produce a much whiter lime than the fossiliferous rock.

#### HYDRAULIC CEMENT

Has been made by Mr. Hotchkiss, near Bennington, from the lower layers of his quarry. This stone resembles in general appearance the massive beds at Madison, lying above the *Favistella* layer. It seems to be the geological equivalent of these beds and of similar outcrops near Weisburg, but there are no fossils to prove the identity. It is a pale blue stone, turning greenish on exposure to the weather. The lowest layer that has been worked is darker. There are some irregular streaks of hard limestone, especially in the upper layers, which underlie the building stone. On burning it becomes greyish yellow, and the ground cement, when pressed with the finger, has a glossy appearance. It hardens more quickly under water than in the air. A specimen mixed with half its weight of sand, and made into a cake three-eighths of an inch thick upon a piece of stone and immersed in water, was hard, and had a perfect gloss at the end of fourteen hours. Mr. Hotchkiss says the cement does not check in drying, and that it sets under water in fifteen minutes, and the continued action of water for some months only seems to harden it. It adheres strongly to stone. Specimens may be seen on outside stone work that have been exposed to the weather since the fall of 1871, and seem to become harder with age. The distance of the quarry

from a railroad or the river is one of the chief difficulties in the way of establishing manufactures at this place on a large scale.

A similar stone crops out at various points near the junction of the upper and lower *Silurian* in Jefferson, Switzerland, Ripley and Dearborn counties, but no satisfactory tests have been made within my district, except at the locality specified. Further experiments should be made to prove its durability and its fitness for cisterns. Still more satisfactory results may be obtained by burning the stone for a longer time, or with a more regular heat than could be maintained in the kilns used.

#### BRICK, FIRE CLAY, ETC.

Bricks consist essentially of clay, moulded into convenient form and hardened by drying and burning. Pure clay will warp and crack. A certain proportion of sand is needed to make the clay porous, and let the moisture escape from the interior of the mass. Too large a proportion of sand makes the brick fusible. Pebbles of any kind are to be avoided, and little pieces of limestone are especially injurious, as they are converted into quick lime, and when the bricks are wet this absorbs moisture and swells, breaking the brick.

Suitable material for brick making occurs in most parts of these counties. There is a brick-yard at New Alsace, on the yellow clay of the broken upland. The "crawfish" clay of the upland flats near Enterprize, is used, but is rather too tough. Among the terraces there is a variety of material from which to select. At Newtown, the recent alluvium is used, mixed with a due proportion of sand or sandy loam. At Rising Sun, the material is taken from an older terrace. The upper part contains too little sand; but a suitable proportion is found at a depth of ten feet, and the clay at six feet, answers well when mixed with that from below. An old lime-kiln, a section of which is now exposed in the bank, distinctly shows the action of heat on the several parts. The clay wall at the bottom is still hard and firm ;

but as the sand diminishes towards the upper, part the wall becomes more and more crumbling.

A blue fire-clay occurs in Mr. Hotchkiss' quarry, in layers of three inches and less. It turns yellow on burning. Where the river terrace slopes toward the hill, as at Vevay, a stiff blue clay sometimes occurs, which may be derived from the native marl washed from the hillside. This mixed with sand is recommended for setting grates. It is said to be better for steamboat furnaces than genuine fire-clay.

Red pottery-ware was made at Vevay fifty years ago. Yellow-ware was also made near Rising Sun, and stoneware from blue clay on Arnold's creek; but these manufacturers were long since abandoned.

Drain-tile is made at Sunman's, Ripley County, and near Madison. For this purpose a purer clay is required than for brick. A premium was offered by the Switzerland and Ohio Counties Agricultural Association, for the establishment of this industry in either of these counties. If the demand should warrant the enterprize, suitable clay can be found at certain places.

#### GRAVEL

Suitable for roads is found at many places in the river terraces, including those of the Whitewater and Miami. No suitable deposits are accessible on the high land.

#### MOULDING SAND

For heavy work is procured from the railroad cut near Newtown. Kettles eighty-four inches in diameter are cast by Mr. Stedman, of Aurora, in the green sand; for light work this is mixed with sand from the Ohio River.

#### SALT.

The manufacture of salt was carried on in early times, when transportation was difficult; but this industry was long since abandoned, as there are no salt wells or springs

strong enough to make it profitable. There was a government reservation kept for this purpose on section 25, township 6, range 1 west. Salt was made in the early part of this century on Grant's creek, at the mineral springs already described—ten or twelve kettles used. The Indians are said to have made salt at this place. Several bushels were made in 1840–42, in Jefferson county, from a boring on section 12, township 5, range 11 east. Borings of about 200 or 250 feet were made at Hartford, with no satisfactory results. It is said that thirty gallons of water from a salt lick in Dearborn county, near Hartford, were evaporated by Mr. Wilber and produced nearly four pounds of salt, which was pretty good, but yellowish. Salt was obtained from a boring at Jacksonville, Switzerland county, but the brine was too weak to be profitable.

#### FERTILIZERS.

There is an abundance of limestone which can be cheaply burned. No beds of gypsum are found.

There is a small quagmire near Hartford, rich in decaying organic matter, which may prove to be valuable.

The blue marl which is interstratified with the limestone, contains a good proportion of phosphates, and Dr. Locke, of Ohio, says it would be a valuable fertilizer.

Mr. Drayton and Col. Mitchell, of Aurora, propose to manufacture a phosphate, for agricultural purposes, from the blue clay or limestone of that locality.

Remarks on the use of fertilizers will be found under Agricultural Geology.

#### IRON ORE.

Good bog ore occurs in many parts of the broken upland, but has not been seen elsewhere. In each spot it seems confined to a few rods or a few acres near the hilltop, but several outcrops occur near one locality, as near Quercus Grove. There are ledges from six to fourteen inches thick, but the stratum is seldom continuous, being divided into pieces a yard or less in diameter. Drift pebbles occur

through the mass in many cases. The ore is most frequently noticed at the surface, or where struck by the plow, but it has been seen eight or nine feet deep. No great depth is to be expected, as the limestone occurs below. In one or two localities the soil is barren, but farmers generally say they observe no difference in this respect. If the ore exists in sufficient quantities near good shipping points, it may prove valuable.

The principal localities in Dearborn county, are near Guilford, and Dillsborough; in Ohio county, on James Kittle's farm, section 5, township 3, range 2 west; on A. Barrecklow's, section 30, township 4, range 1 west, and on Benjamin Miller's farm, near Rising Sun; in Switzerland county, on several farms near Quercus Grove, and several farms northwest and northeast of Vevay.

#### LEAD.

There are traditions that the Indians gathered the ore by the apron full, and pieces of galena have been picked up in various places, but no vein has been discovered, and I have seen no specimen known to belong to this geological district. The long continued unsuccessful search has proved that no workable ore is to be found. Some of my inquiries ended in such information as this: A says that B said that a certain person thought he could point out the mine!

#### GOLD.

Dr. Dorsey of Hartford, examined the drift of that region, and found one small particle of gold from two panfuls of sand. Ohio county, is not destitute of this widely disseminated metal, though it does not occur in any paying quantity.

### CHAPTER IV.—AGRICULTURAL GEOLOGY.

While this subject is properly one branch of economical geology, its importance demands a separate chapter, which will be devoted especially to the interests of the farmer.

Agriculture is eminently a matter of experience, yet there are certain underlying principles that should be understood in order that the farmer may avail himself of the experience of his brother farmer, who is laboring on a different kind of soil, with different topographical features, different crops, or a different climate. This chapter will embrace some applications of geological truths to the most important industry of this district, and if I step beyond the limits of strict geological science, I trust the effort to make this report a work of practical value will be a sufficient excuse.

The carpenter acquaints himself with his tools, and the various kinds of wood; the iron smelter studies his ores, fluxes and coals, and the agriculturist can not understand too well the nature of the soil from which he would gather his harvests, the changes that are wrought by cultivation, and the most successful means of preserving or increasing its fertility. While the blue limestone region is not rich in mineral wealth, the soils of this district are among the most productive in the State.

#### DESCRIPTION OF THE SOILS.

A good soil must have certain properties in order to afford a suitable support for the roots and stem of the plant, to furnish the needed food and to bring this within reach of the plant. If it is very light and sandy, the soil may be blown away from the roots, leaving them bare and without sufficient support; the rains, penetrating too quickly, may sink away and be lost, or may evaporate too fast, leaving the crop to perish for lack of moisture. A close, stiff clay soil allows the water to pass through with difficulty; much flows off from the surface. When thoroughly wet, evaporation goes on slowly; it remains wet and is slowly warmed by the heat of the sun. The roots can not penetrate so far as they should in search of food. Several kinds of plant food are always required. The ingredients that are most often lacking (besides moisture) are potash, lime, phosphates, and the products of decomposing organic matter. Some of these

substances exist naturally in small proportions, and by constant cropping the amount becomes too limited to produce good crops.

To describe fully every variety of soil in a single township would require more space than can be allowed to this whole report. A single farm of half a section, may include part of a rich bottom that has just received its annual deposit from the river, a dry gravel terrace, a cold wet clay terrace and rich black hillsides. Even on the same acre, the best of the soil may wash from the poor gravelly red ridges, where the wheat is hardly worth cutting, and enrich the lower parts, which are clothed with a luxuriant growth of grain. While there is such a diversity on every side, there are some prominent features that are most abundant in certain sections. If this district were divided with respect to the prevailing character of the soils, the boundaries would nearly correspond with those laid down on the map to distinguish the topographical character of the several parts. The properties of a soil are observed in handling a specimen, working the field or noting the agricultural products, but we also want to know its origin, the amount of slope and the aspect, or direction of the slope. The erosion to which the land has been subjected may influence its character, and the native timber is a good index of its quality.

The typical soil of the upland flats is derived from true drift, with which it is underlaid. It consists chiefly of stiff, cold, wet clay, of ashen color. Water stands on the surface after a rain. The soil is shallow, for it is too stiff and close to let the roots and moisture penetrate readily. The subsoil, when wet, is very sticky; it adheres to the spade like putty. When dry, it is very hard, the spade will not penetrate it. The ground near the watersheds is called *crawfish* land from the abundance of these animals. Their holes retain water all summer. Where there is more natural drainage, this is not the case. Towards the broken land, in all directions, the soil is more yellow and mellow, and appears to have a larger proportion of sand. This is seen on the surface after a rain, when a rill that has accumulated the sand, spreads



out over a more level space, and dropping the sand, carries the clay beyond. The subsoil, in many places, is a mixture of yellow and bluish clay, with more or less sand. In the northwest part of Switzerland county, fragments of chert are very common, thinning out and disappearing a few miles from Jefferson county.\* In some parts of the flats, especially on the wet spots, the hard ferruginous pebbles or concretions abound, referred to in describing the drift.

The prevailing timber of the upland flats varies with the nature of the surface. White Oak and Beach abound. Other oaks, several kinds of Hickory, Black Gum, and Dog wood are common. Poplar, Walnut and some Sassafras, grow near the breaks.

On the broken upland the amount of drift varies according to the thickness of the original deposit and the amount lost by erosion. The limestone and marl add to the fertility where they are exposed to the air or streams. In some parts the rock crops out at the surface, in others there are many drift pebbles, the clay having been removed; in still others, the digging of wells shows the true, unmodified drift. These soils are yellow, except where a large amount of organic matter has accumulated, as in the native forest or by the use of green manure. Although the vegetable mould is generally more abundant on the hillsides than here, yet this soil has the advantage of retaining the moisture better than that which is darker and more mellow.

Sugar Maple, Black Walnut, White Walnut, Beech, Hickory, White Oak, Linden, Elm, and Red bud are common species of timber.

The still more broken land, including the hillsides, contains in the blue limestone formation all the mineral ingredients essential to perpetual fertility, but these must be modified by disintegration and the addition of organic matter, before they can be appropriated by the plant. Some steep, barren hillsides are practically worthless. Having

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\*The cherty feature, which must be attributed to Niagara rocks, is strikingly exhibited in a railroad cut east of Osgood, Ripley county.

been cleared, or bearing but little timber, they do not support even a good crop of weeds. The soil is washed off as fast as it is formed. In more favored localities a thin white clay soil accumulates, sufficient to produce a scanty crop of wheat. In still others, the forest leaves are mingled with the soil, or a crop of clover has been plowed in, furnishing the organic matter that is needed to make the rich. "black hillsides." Note the fertile slopes near Rising Sun, where the hills are covered with a garland of trees. A farm on Grant's creek produced satisfactory crops of corn and wheat for fifty years, when it was thought necessary to restore the land simply by raising hay. This is not an exceptional instance, for the hillside farmers claim that a proper rotation alone is necessary to maintain the fertility unimpaired. As every crop taken from the field withdraws some potash phosphates and other plant food, it must not be supposed that the same soil will yield undiminished crops. Every rain washes something from the surface toward the creeks, the water takes up carbonate of lime from the surface of the rock, and every rootlet that penetrates the marl below aids the frost and sunshine in the process of soil making. Thus the field undergoes a constant renovation, and it is the abundant supply of food stored up in the underlying marl and limestone that give this region its inexhaustible fertility.

The southern exposure is generally regarded as the most fertile, though abounding in loose stones. One farmer says the eastern slope is better for wheat than the western, since the crop receives the benefit of the morning sun and is less apt to rust.

Black Locust and Honey Locust are specially characteristic of the limestone soil. Several Oaks, Ash, Beech, Elm, buckeye, Linden, Wild Cherry, Hackberry and Mulberry also abound. Walnut and Sugar Maple are indicative of rich soil.

The terrace soils remain to be described, which are derived entirely from modified drift and material washed from the several formations of the Ohio valley. The

ingredients are so varied that no essential mineral element is wanting. The creek deposits derived from the blue limestone resemble the hillside soil, in being stiff, clayey and whiteish wherever the organic matter is exhausted, but with this ingredient the creek soil is very similar to the rich, black hillsides.

The gravel of the river terraces would easily admit the air and rain, and quickly yield to these decomposing agencies, producing good land. Some terraces contain gravel only a foot below the surface, in others the soil is deep. There may be an understratum of coarse or fine gravel, or even of fine clay. Some river terraces are very sandy, as the low bottom above Rising Sun. Some are stiff and clayey, as a narrow strip on the north side of the Sand Run; this may be attributed to material washed from the hillsides. The recent river deposits are always fertile, and where a frequent addition of river mud can be secured, no apprehension is entertained that the land will be exhausted.

Willow, Elm and Buttonwood grow near the streams. Soft Maple, Oak, Poplar, Walnut, Hickory, Hackberry, Ash and Buckeye are also native to this soil. Beech, here as elsewhere, indicates a clayey soil. The Black Locust, though abundant on some of the gravel terraces, was probably introduced by man and has since retained its hold.

#### CROPS.

The chief field crops are corn, potatoes, wheat, timothy, clover, oats, barley, rye and onions. Fruit is raised in all parts, and a few of the farmers give some attention to timber planting.

Corn is especially adapted to the rich bottoms, as these receive frequent additions of rich alluvium from the overflowing river. The crop is sometimes destroyed in these localities by late floods. The higher bottoms, which are not so rich in vegetable matter, are well adapted to wheat. Potatoes and the various grains are extensively raised in all parts except the upland flats. Switzerland county is noted

for the amount of timothy shipped for the southern market. It is estimated that fifteen thousand tons were exported from September 1st, 1871, to July 1st, 1872. The upland flats are better adapted to hay than to cereals. Good crops of timothy are raised, but this grass is crowded out in a few years by red-top, (*Agrostis vulgaris*) which in turn gives place to wire grass, (*Poa compressa*) and others. By proper culture and rotation one good crop of wheat or corn may be raised every few years. Clover is raised to advantage on the more mellow broken land. There is a larger proportion of clover in Dearborn than in Switzerland county, since this is quite as profitable as timothy for home use, and the facilities for shipping south from Dearborn county are not so good. Some onions are exported from Switzerland county.

The fruits most extensively raised are apples, peaches, plums (usually the Damson) and cherries. Pears, quinces and small fruits are also raised, especially for home use. Success depends upon a proper location, to avoid frost, quite as much as upon the nature of the soil. High rolling ground is preferred, since the colder air sinks by its greater specific gravity into the lowest place within reach, and the high points are not subject to the same degree of cold as the neighboring low places. Good apples are raised even on the "crawfish flats," especially on the highest points. On the river bottoms, good fruit is sometimes produced (as in 1871,) when killed by frost on the adjoining hills. In this case it was probably protected by fog.

Timber planting has not received the attention it deserves. Black Locust grows quickly, and will produce a crop of good fence posts with some firewood every fifteen years. Farmers object to its proneness to send up suckers on the adjoining ground; but they may be kept within bounds in groves on rough ground near the ravines, or on the steep hillsides that are worthless for other purposes. The trees should be four to six feet apart each way. If this course is followed, a fertile soil may accumulate on the barren slopes, when they are shaded by the trees and receive the addition

of leaves each year. The cedar thrives on stony bluffs, and is recommended for such places; the larch has also been tried elsewhere if not in this district, and promises to be a profitable tree. Oak, Poplar and Walnut require at least a century to reach their full development, but future generations will require timber, and their needs should be regarded as well as our own.

#### PRACTICAL SUGGESTIONS ON HUSBANDRY.

The farmer's habits of observation enable him quickly to detect a field of natural fertility that has been *worn out*. By bad management it has been so changed that it will produce but one-half or one-third the crop that was raised on the virgin soil. The products are the criterion, rather than the appearance of the soil. By careful and judicious culture, on the other hand, the exhausted farm, or one not generally fertile, may be so improved as to yield double or quadruple crops. The changes, whether of deterioration or restoration; will depend upon the natural condition of the ground, the crops raised, and all those methods of treating the soil and crops that are embraced in the term, *husbandry*. I have sought to use every opportunity to converse with intelligent farmers and learn the methods they have used, the effects of such treatment and the systems which their experience enables them to recommend for this particular district. It is almost amusing to note difference of opinion on some of the simplest questions. One says that timothy improves the land; another, who is differently situated, that it deteriorates it, and that it was once as easy to raise two tons per acre as it now is to raise one ton on the same ground. One farmer recommends trench plowing, his crops having been improved by it; another tried it on the upland and years were necessary for the ground to recover its former productivity.

The soil may lose its fertility, as we have seen, by taking the products off the farm each year, leaving less plant food in the ground for the next crop. This process has been carried on in a great part of this district. Some of the upland

has been exhausted by raising corn so that now it is difficult to get grass well set. The timothy crop has been impoverishing the soil more slowly, but not less certainly. It is estimated by chemical analyses that an average ton of timothy hay contains :

Potash .....	40 lbs.
Lime.....	13 lbs.
Phosphoric acid .....	15 lbs.
Other mineral substances.....	74 lbs.
	<hr/>
	142 lbs.

Although 142 pounds of mineral substance may seem a small matter to take from a half acre of ground, it must be remembered that some of these ingredients exist in very small proportions in the soil, and only a small part of these may be in a soluble condition ready to be taken up by the moisture and given to the plant. Is there any means to supply this deficiency? Some improvement is generally made where clover is sowed, especially if the green crop is plowed in. The vegetable matter, even of the roots, tends to loosen the soil, and admit the air and moisture to bring a new quantity of phosphates, etc., into a soluble condition. Another plan, recommended for exhausted yellow soil of the upland, is to sow a crop of rye in the fall, clover in the spring, and turn in a drove of hogs in September for pasture. The rye will seed itself for the second year, when the hogs should be turned in again. Plowing in green manure and pasturing the ground are alike insufficient to add any mineral substance to the soil, and the most natural remedy is to use some fertilizer which will replace the elements removed. Stable manure is highly prized, and should be carefully husbanded; such a rotation is recommended that part of the farm be occupied by corn or wheat each year, and that these crops receive the manure. Rotten straw has been plowed under with satisfactory results. I am told that the improvement could be observed eight or ten years afterwards. Other fertilizers are needed to restore what is sold from the farm, and actual experiment alone will determine

what is best adapted to the several conditions. A few experiments have been tried with lime, plaster of Paris, and other artificial fertilizers, but as a record has seldom been kept of the actual cost and of the probable improvement by increasing the crops, a great difference of opinion exists concerning the practical money result. A farmer's deliberate opinions deserves all due respect, but a strong prejudice seems to prevail among some who have never tried any fertilizer, that just as long as they can clear a margin beyond their expenses, the use of artificial manures is throwing money away.

Many farmers have told me that they see the increased growth of weeds or grass near a limekiln, or where a log-heap was burnt. This observation is insufficient, however, to *prove* the value of *lime*, since the improvement may be due to the lime, or to the ashes which are rich in potash, and are known to be beneficial. A few farmers have applied lime to the soil, and generally have expressed themselves well pleased with the result; but an excess is injurious. One farmer tried twenty to twenty-five bushels to the acre with no apparent benefit. Although limestone abounds in the underlying beds, this does not crop out on all parts of the surface, and even where it does the lime is more easily dissolved and seems to be more effective as a stimulant for the plant. A plan tried near Quercus Grove is to moisten the seed corn and roll it in a mixture of lime and tar. This process is believed to improve the growth of the corn, as well as to protect the seed from some of its insect enemies, and the expense is trifling.

Land plaster, or uncalcined ground gypsum, is advantageous, especially for clover, and through this crop it benefits those which follow it.

An artificial fertilizer containing phosphate of lime has been tried with success in Dearborn county, but it should be used with moderation; an excess destroyed a crop of corn.

The remarks on fertilizers apply especially to the uplands, but similar needs exist in the high terraces of both rivers and creeks. Deep plowing, or even trench plowing, is

recommended here to bring up a subsoil that will easily become fertile by exposure. On the upland flats this is not practicable, because the subsoil, if brought to the surface, is not fitted to produce good crops without years of weathering. It is very possible that plowing one or two inches deeper than has been customary would not injure the surface soil, but would improve it by adding a new supply of potash, phosphates, etc. If barnyard manure or a crop of green clover is plowed under at the same time, it would be a great help in mellowing the stiff clay. After a few years the plow might be put still deeper, thus taking advantage of such resources as have been lying idle, though close at hand. It is probable that this land would be improved by *subsoiling*, or loosening the subsoil to a depth of a foot or more, without bringing it to the surface.

The flats are much improved by drainage. The commonest and cheapest way to effect this is to leave an open furrow at every two or three rods. This will only carry off the surface water, and the furrows require constant attention, besides occupying a considerable part of the land. Another plan is to lay poles in trenches, and cover them with earth. These make a sufficient outlet for water and do good service. The best and most satisfactory method is to lay drain tile. Mr. U. H. Stow, near East Enterprise, has tested the value of underdrainage on crawfish land, though the cost of bringing the tiles from Jefferson county adds materially to the expense. Mr. Stow says that drains three feet deep and six rods apart will be a great benefit. Apple trees, when drained, do not fail to produce good crops, and grapes send out their roots for rods, following the moisture.

Though the hillsides can be used indefinitely without fertilizers, they are liable to be injured by washing. Care must be taken on this account not to raise corn too long on broken ground, without a proper rotation of small grains or hay to allow the vegetable matter to accumulate. Pastures should not be cropped so close as to leave the ground bare, for when the gulleys take possession of the land it is a very expensive matter to reclaim it. The use of the "hillside



plow" is also strongly recommended, for if the field is plowed "round and round," part of each furrow will be up and down hill, and help the rains to carry off the soil.

The effect of shade, as a means of restoration, is illustrated on the farm of Mr. Givens, near Florence. A stony point, on which no soil had accumulated for several years, was covered with a pile of rubbish. When the evaporation of moisture was thus arrested, some blue grass seed that had lodged there germinated, and soon the plant was established. In three years the ground was well set with a natural growth of blue grass, and a soil had accumulated that could not easily wash off.

If a piece of clay is kneaded in the fingers, and placed in the sun to dry, it becomes hard. The same condition is seen in the surface of a road, when the mud has been worked by wheels and then dries. If clay soil is plowed while wet, a similar change takes place, it "bakes" and the roots can not so easily penetrate; if seed has recently been sown, the tender shoot has a hard crust overhead between it and daylight. The tramping of hoofs is apt to produce the same result, and the best farmers will not pasture a meadow from which they expect to cut a crop of hay.

The loss of river property by the wearing away of the bank is so serious as to demand prompt action. Paving and riprap are confined to the towns, on account of the expense. Brushwood, thrown over the bank and weighted down with stones, does good service in breaking the force of the waves and current when the river is high. The best means of meeting the difficulty is to encourage the growth of willows and other trees on the slope. Much injury has been done by clearing the native timber close to the water's edge. Willows grow readily on any part of the shore that is not too stony, provided that they can be protected from the cattle for three years. It is difficult for individual farmers to fence out the stock, as the water would wash away the fences required at a low stage. If cattle were kept away entirely, either by law or by mutual agreement, willows would quickly spring up in many places where they are now kept down by

the browsing of cattle. Willows have been planted out at various points with very satisfactory results. Mr. George Hickman, above Florence, recommends that some elms be set out with the willows. The willow cuttings should be put in as early as possible, as the winter or spring flood goes down, that they may be well rooted before the summer drouth. When the willows are cut off, they quickly grow up, and Mr. Golay, near Vevay, finds that he can use one-third of the crop each year for baling hay, without interfering with the primary object of the trees.

A rill flowing over the edge of a high terrace, as that below Vevay, very easily washes the loose gravel so as to do much damage in a single season. Care should be taken to control the drainage so that the water will have as little erosive force as possible. This is accomplished by conducting the stream away from the bank and down a gradual slope, or by putting in a trough to convey the water beyond the gravel bank.

#### EXPERIMENTS.

Now to my friends who are engaged in agriculture, allow me to express the wish that you may adopt such plans as will make the occupation profitable, and not only so, but that it may pay you the richest rewards of which it is capable. You desire to realize the largest possible profits, with the least necessary expenditure. But if a farm nets \$10.00 per acre when a profit of \$20.00 or \$30.00 is within reach, is not this poor management? It would be bad financiering to lend money at 6 per cent. when 8 per cent. can be obtained with good security. You have learned the importance of using the most improved implements, is it not equally essential to adopt the very best system of rotation, management and use of manures? Be assured of this that *it will pay* to adopt the very best methods, since the best methods are those which in the long run make the best returns; but many questions, yet to be decided, are included in this, what are the best methods? Our knowledge of botany and chemistry is founded on experiment and

observation. If agriculture is to maintain its ground with the advancing sciences, this also must be aided by judicious experiments. The more care is needed in this case, since we have to deal with the varying conditions of soil, location and climate; while proximity to market and the capital that can be invested will affect the practical results. While experimental stations are established at various agricultural colleges, to do this work with great accuracy, some simple experiments may be conducted here, to elicit new facts for the benefit of these regions of drift and blue limestone. These may be conducted by individuals or through the agricultural societies. To be of value they must be planned to determine but *one thing at a time*. For instance, if it is desired to know whether the wheat crop on a certain kind of land would be benefitted by the use of lime, select a field as nearly uniform as possible, sow a certain quantity of lime, as ten or twenty bushels per acre, on one-half the ground, sow the grain evenly over the whole field, and treat both parts exactly alike. After the harvest, measure and weigh the wheat from each part of the field, and see which has been the most productive. If there is any difference in favor of the lime, calculate from the ruling price of wheat, the net proceeds for this year of the money invested in lime. The experiment is not yet complete, for the lime is not exhausted in a single year. Whatever rotation is adopted, keep watch of that field, and record the results from year to year; note how long the benefit of the lime can be observed. In practice, it may be better to add a small quantity of lime year by year.

It is with no thought of slighting the labors of those farmers who have tried experiments that I make these suggestions for more accurate investigations. Something has already been done, but it is only by such patient and accurate work that you can satisfy yourselves *how much* benefit you can expect from any plans that may be recommended. By patient, laborious experiments alone, can we hope to reach anything like true scientific agriculture. Although the trouble and expense of working by weight

and measure may not be rewarded by a proportionate increase of the crop in every instance, yet this is our means of studying nature. Even as an intellectual occupation, this is delightful; how much more when you may hope to realize new truths that will benefit the whole community, and you are studying the operations of Him who "gave us rain from heaven and fruitful seasons, filling our hearts with food and gladness."

#### ACKNOWLEDGEMENTS.

I can not close this report without returning my sincere thanks to all who have kindly given their aid in the labor of collecting the facts now presented to the public.

Besides the favors received from those whose names occur in the body of the report, I am indebted to the officers of each county for the use of maps and other information; to President Martin, of Mooreshill College, for access to the cabinet; to Messrs. G. W. Morse and T. E. Alden, of Rising Sun, for special favors; to Dr. Sale, of Dillsborough, Mr. B. North, of Ohio county, Messrs. John Gill, John Shroder and Armstrong, of Vevay, and very many others.

To Dr. G. Sutton, of Aurora, and Mr. C. G. Boerner, of Vevay, I am indebted for many kind favors, besides their additions to the report, which will be found in another part of this volume.

VEVAY, INDIANA, Nov., 21, 1872.

DEAR SIR—I have the honor to transmit to you a paper on the meteorology of Switzerland county, Indiana, prepared by me at the request of your assistant Prof. R. B. Warder, while engaged in the geological survey of this county last summer. From the limited time he allowed me, I have not been able to make the report as full as I wished, however I have carefully prepared a set of tables on the Barometer, temperature, rain and snow, which I have no doubt will prove of general interest in connection with the geological survey.

I have been obliged to omit the tables of Psychrometer, clouds, wind and velocity; these subjects may, however, be deferred for a future time and afford interesting material for a supplement.

I remain with the highest regard,

Your obedient servant,

CHARLES G. BOERNER.

Prof. E. T. Cox, State Geologist.



**METEOROLOGY**

**OF**

**VEVAY, SWITZERLAND CO., IND.,**

**BY CHARLES G. BOERNER.**

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A knowledge of the climate and the laws which govern it, is not only essential, but absolutely indispensable to the welfare of a nation or community. The intelligent agriculturist will not only examine into the chemical and geological components of the soil, but also study the temperature, wind and moisture, which, according to circumstances, may be either beneficial or injurious to his productions and health.

It is alone, by becoming familiar with the principles of practical agriculture, chemistry of the soil, geology and meteorology, that the material and intellectual interests of both farmer and mechanic are advanced, the resources of the soil and the mines developed, which, in connection with commerce and manufactures, lay the foundation of a nation's wealth.

The climate of this county does not differ materially from the adjoining counties, but that there are changes peculiar to each, of temperature and moisture, is evident from observations at points above and below, on the shores of the Ohio river.

It would be mere conjecture to account for these local variations, or their controlling influence; comparison, guided by established facts in meteorology can alone afford us light.

Whether the climate has undergone any striking changes since its first settlement in 1803 can not be ascertained, as there is no record of remote date in existence. During the year 1818, and later, a meteorological register was kept by Mr. John J. Dufour, one of the early settlers, which consisted of temperature, rain and wind. Unfortunately his records are lost, but I am in possession of a copy of the "Indiana Register," of January 27th, 1818, (a weekly paper then published at Vevay) which contains a summary of his observations of the previous week, viz: January 20th, to the 26th.

While no great importance can be attached to the results of a single week in our changable climate, it may be of interest to take a look back fifty-four years, and for sake of comparison I have introduced them with observations of the corresponding weeks of the years 1865 to 1872, and which form the subject of table I.

Mr. Dufour's observations were taken at 6 A. M. and 2 P. M.; those by myself at 7 A. M. and 2 P. M., with the daily means resulting from three observations (omitting the 9. P. M.)

Systematic registry of meteorological phenomena was commenced by myself in 1864, in accordance with the plan adopted by the Smithsonian Institution, at 7 A. M. 2 P. M. and 9 P. M.

The instruments are the Smithsonian standard, made by James Green, of New York, and consist of cistern barometer, psychrometer, thermometer, wind and rain guage.

The geographical position of Vevay, county seat of



Switzerland, Indiana, is latitude north  $38^{\circ} 46'$ , longitude west of Greenwich,  $84^{\circ} 59' 20''.5$ ; hight above the level of the sea 525 feet, and above low watermark, in the Ohio river, 81 feet.

The range of the thermometer, for the past eight years, is equal to one hundred and ten degrees ( $110^{\circ}$ ) from  $-10^{\circ}$  to  $100^{\circ}$ , and from its variability throughout the year, sometimes experiences the cold of Minnesota and the heat of Florida.

Our prevailing winds are from the southwest. The most striking characteristics on the bottom lands along the river are the frequent and dense fogs with which the hill lands are rarely ever effected. The tables are arranged in the following order:

TABLE I.—Comparison of observations January 20th to 26th, 1818, with the corresponding week of the years 1865 to 1872.

TABLE II.—Maximum and minimum pressure of the barometer, reduced to temperature  $32^{\circ}$  Fahr.

TABLE III.—Monthly and annual mean hight of the barometer, corrected for temperature.

TABLE IV.—Maximum and minimum temperature of each month for a series of eight years.

TABLE V.—Monthly and annual mean of temperature.

TABLE VI.—Mean temperature of the four seasons—spring, summer, autumn, winter.

TABLE VII.—Monthly and annual quantity of rain and melted snow, in inches and hundredths.

TABLE VIII.—Monthly and annual quantity of snow in inches and hundredths.

The length of our winters becomes more apparent in the early and late flowering of plants in the open air. For instance, the "Crocus," first of all to expand with the genial rays of the sun, though snow may cover the ground; its appearance is a pretty sure indication of an early or late spring. For comparison, the time of blooming in the open

air, in the same location, is here given for a period of seven years:

1866	-	-	-	-	March 5th.
1867	-	-	-	-	February 26th.
1868	-	-	-	-	March 6th.
1869	-	-	-	-	February 20th.
1870	-	-	-	-	March 19th.
1871	-	-	-	-	February 25th.
1872	-	-	-	-	March 18th.

Thus it will be seen that the earliest blooming occurred in 1869, and the latest in 1870; and that 1870 and 1872 show a difference of only one day, the two extremes about four weeks.

TABLE I.

*Comparison of Thermometer, January, 1818 and 1865 to 1872.*

January.	1818.				1865.				1866.				1867.				1868.			
	6 A. M.	2 P. M.	Mean.		7 A. M.	2 P. M.	Mean.	Mean of 3 obs.	7 A. M.	2 P. M.	Mean.	Mean of 3 obs.	7 A. M.	2 P. M.	Mean.	Mean of 3 obs.	7 A. M.	2 P. M.	Mean.	Mean of 3 obs.
20	42.	46.	44.0	°	20.	36.	28.0	28.3	15.	20.	17.5	15.0	22.	28.	25.0	25.3	33.	37.	35.0	34.3
21	44.	55.	49.5	°	36.	40.	38.0	37.3	8.	25.	14.5	17.6	22.	24.	23.0	22.6	37.	38.	37.5	35.3
22	40.	50.	45.0	°	36.	40.	38.0	36.6	25.	36.	30.5	30.3	21.	31.	24.0	24.0	22.	42.	32.0	34.6
23	30.	40.	35.0	°	28.	27.	27.5	25.0	30.	36.	33.0	32.6	22.	28.	25.0	23.0	40.	47.	43.5	41.6
24	40.	55.	47.5	°	16.	22.	19.0	16.0	34.	30.	35.0	34.6	24.	26.	25.0	26.0	22.	30.	27.5	23.6
25	30.	44.	37.0	°	5.	22.	13.5	15.0	32.	35.	33.5	33.0	30.	48.	39.0	33.3	15.	45.	30.0	32.0
26	44.	42.	43.0	°	10.	20.	15.0	13.3	31.	40.	35.5	34.3	22.	26.	24.0	22.6	38.	47.	42.5	41.6
Mean.	38.6	47.4	43.0		21.6	29.6	25.6	24.5	25.0	32.6	28.5	28.2	23.3	30.1	26.4	25.3	29.6	40.9	35.4	34.7

TABLE I.—Continued.

	1869.				1870.				1871.				1872.			
	7 A. M.	2 P. M.	Mean.	Mean of 3 obs.	7 A. M.	2 P. M.	Mean.	Mean of 3 obs.	7 A. M.	2 P. M.	Mean.	Mean of 3 obs.	7 A. M.	2 P. M.	Mean.	Mean of 3 obs.
January 20.....	33.	45.	39.0	36.0	25.	46.	35.5	35.0	30.	44.	37.0	38.3	36.	35.	35.5	34.3
January 21.....	27.	45.	34.0	36.3	27.	43.	35.0	34.2	31.	49.	40.0	42.2	28.	30.	29.0	38.9
January 22.....	34.	43.	38.5	32.0	33.	56.	44.5	48.0	28.	35.	31.5	31.5	29.	43.	34.0	36.7
January 23.....	24.	45.	34.5	33.3	52.	43.	47.5	45.3	20.	46.	38.0	36.5	30.	23.	26.5	24.7
January 24.....	31.	54.	42.5	42.3	35.	33.	34.0	33.7	30.	36.	33.0	31.7	10.	19.	15.5	14.7
January 25.....	31.	31.	31.0	28.3	33.	44.	38.5	39.3	28.	30.	29.0	28.8	10.	22.	16.0	16.0
January 26.....	15.	40.	27.5	26.0	32.	58.	45.0	44.3	30.	27.	28.5	27.5	18.	29.	23.5	25.0
Mean .....	27.9	49.3	35.3	33.5	33.9	46.1	40.0	35.7	29.6	36.7	33.9	33.6	23.0	28.7	25.7	25.7

TABLE No. II.  
Barometer Reduced to 32° Fahrenheit.

YEAR.	January.		February.		March.		April.		May.		June.		July.		August.		Septemb'r.		October.		November.		December.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
1867 .....	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.
1868 .....	30.10	29.15	30.11	29.32	29.88	28.75	29.75	28.93	29.60	29.00	29.60	29.15	29.45	29.03	29.52	29.10	29.65	29.15	29.85	29.15	29.97	29.15	29.87	29.15
1869 .....	29.67	29.10	29.75	28.80	29.82	29.07	29.67	28.84	29.72	29.03	29.89	29.18	29.84	29.46	29.87	29.50	29.60	29.42	30.03	29.26	29.94	28.77	30.09	29.15
1870 .....	30.05	28.92	29.88	28.73	29.96	28.51	29.76	29.14	29.68	28.90	29.74	29.13	29.66	29.21	29.74	29.31	29.74	29.28	29.90	28.95	29.95	29.16	30.08	28.86
1871 .....	29.96	29.15	29.97	28.74	29.79	29.05	29.93	29.01	29.69	29.16	29.63	29.16	29.71	29.22	29.68	29.19	30.01	29.30	29.88	29.27	29.93	28.85	30.09	29.07
1872 .....	29.96	29.04	30.05	29.01	30.00	28.82	29.85	28.98	29.83	28.88	29.68	29.18	29.63	29.25	29.77	29.32	29.80	29.03	29.84	29.24	.....	.....	.....	.....
Mean .....	29.95	29.09	29.95	28.92	29.89	28.84	29.79	28.98	29.70	28.99	29.31	29.16	29.66	29.25	29.72	29.28	29.77	29.25	29.90	29.17	29.91	29.02	29.99	29.03

TABLE NO. III.

Mean Elevation of the Barometer.

YEAR.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual Mean.
1867 .....	In. ....	In. ....	In. ....	In. ....	In. ....	In. ....	In. ....	In. ....	In. ....	In. ....	In. ....	In. ....	In. ....
1868 .....	29.29	29.66	29.49	29.46	29.30	29.38	29.24	29.33	29.33	29.48	29.53	29.57	29.575
1869 .....	29.41	29.35	29.41	29.31	29.39	29.62	29.61	29.67	29.74	29.61	29.55	29.48	29.406
1870 .....	29.54	29.43	29.46	29.47	29.43	29.45	29.47	29.48	29.54	29.55	29.55	29.56	29.528
1871 .....	29.63	29.49	29.42	29.35	29.46	29.43	29.47	29.44	29.60	29.58	29.52	29.62	29.501
1872 .....	29.59	29.46	29.53	29.50	29.48	29.48	29.47	29.52	29.50	29.61	.....	.....	29.514
Mean .....	29.49	29.43	29.46	29.42	29.41	29.47	29.45	29.49	29.54	29.57	29.55	29.58	29.493

TABLE No. IV.  
Maximum and Minimum Temperature of each Month during a series of Eight Years.

YEAR.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
1865 .....	45.0	-2.0	63.0	14.0	78.5	16.0	82.0	34.0	89.0	42.0	95.0	63.0	100.0	60.0	95.0	58.0	93.0	51.0	95.0	37.0	78.0	24.0	76.0	6.0
1866 .....	69.0	44.0	70.0	-7.0	76.0	18.0	97.0	33.0	98.0	46.0	99.0	50.0	100.0	67.0	96.0	50.0	90.0	50.0	82.0	32.0	64.0	27.0	60.0	5.0
1867 .....	57.0	0.0	62.0	-10.0	61.0	11.0	83.0	31.0	95.0	35.0	99.0	60.0	100.0	68.0	98.0	52.0	97.0	42.0	90.0	28.0	77.0	10.0	72.0	11.0
1868 .....	60.0	0.0	61.0	45.0	82.0	10.0	85.0	23.0	95.0	50.0	95.0	60.0	99.0	73.0	90.0	58.0	86.0	44.0	80.0	30.0	68.0	28.0	57.0	-2.0
1869 .....	61.0	15.0	70.0	13.0	71.0	6.0	76.0	30.0	84.0	43.0	90.0	51.0	93.0	60.0	95.0	57.0	88.5	42.0	77.0	21.0	61.0	21.0	51.0	18.9
1870 .....	58.0	5.0	59.0	1.5	62.0	15.5	85.5	31.0	90.0	46.0	94.5	56.0	93.0	60.5	94.0	58.5	90.0	53.0	79.5	39.0	73.5	24.0	61.0	-4.0
1871 .....	65.5	13.5	67.0	20.5	76.0	20.0	82.0	32.0	88.0	44.0	91.5	61.0	97.0	58.0	96.0	56.0	88.0	37.0	84.0	32.0	72.0	18.0	64.0	-7.0
1872 .....	47.0	2.0	58.0	5.0	69.0	10.0	85.5	32.0	86.0	46.5	89.0	59.0	92.0	65.0	96.0	53.5	83.5	45.0	87.0	30.0	.....	.....	.....	.....
Mean...	60.31	4.69	63.63	5.25	72.19	14.56	84.50	30.75	90.63	44.06	94.13	57.50	96.75	63.94	95.00	55.38	91.06	45.50	84.44	31.13	70.50	18.38	55.13	3.38

From November to December, the average is for seven years

TABLE No. V.  
Monthly and Annual Means of Temperature.

YEAR.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual Mean.
1865 .....	26.8	27.4	43.7	56.4	64.4	77.5	77.8	74.8	77.2	66.0	44.1	34.7	55.32
1866 .....	22.3	33.5	42.1	61.8	64.4	77.8	84.7	75.9	68.9	68.0	45.3	31.9	56.46
1867 .....	24.7	41.7	38.6	55.7	61.4	79.5	80.3	80.2	74.0	67.8	47.0	34.9	56.33
1868 .....	29.2	33.7	50.3	53.1	67.5	76.9	84.8	78.3	65.3	54.9	44.1	30.1	55.55
1869 .....	31.1	38.0	37.8	51.3	61.3	69.9	78.8	76.5	68.5	46.5	39.8	35.7	52.52
1870 .....	34.7	34.4	39.1	55.4	66.8	72.8	77.9	75.4	71.4	58.1	44.9	32.1	55.35
1871 .....	25.5	37.7	50.3	58.8	66.0	74.9	75.2	77.4	64.8	57.5	42.1	39.5	55.99
1872 .....	28.9	33.3	37.1	57.4	68.8	72.5	77.2	76.2	63.0	54.3	.....	.....	.....
Mean .....	30.27	36.21	42.61	56.24	64.32	75.25	79.21	78.60	69.50	55.39	43.87	33.13	55.66

TABLE No. VI.

*Mean Temperature of the Four Seasons.*

YEAR.	SPRING.	SUMMER.	AUTUMN.	WINTER.
1865 .....	66.13	76.60	45.27	37.30
1866 .....	68.00	76.50	45.37	36.00
1867 .....	65.57	78.17	46.60	35.00
1868 .....	65.87	75.63	43.03	37.73
1869 .....	60.80	73.00	40.60	33.67
1870 .....	65.00	74.90	45.03	36.07
1871.....	66.57	72.47	43.37	41.17
1872 .....	65.57	73.80	.....	33.07
Mean .....	65.44	75.19	44.18	36.50



TABLE No. VII.

Monthly and Annual quantity of Rain and Melted Snow in Inches and Hundredths.

YEAR.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual Amount.
1865 .....	4.70	0.62	2.70	5.73	11.80	2.45	4.70	1.98	6.51	1.55	1.25	6.70	50.69
1866 .....	3.95	1.24	5.72	1.69	1.50	5.23	6.95	1.47	15.25	1.43	4.22	3.09	52.44
1867 .....	6.13	7.24	5.52	1.76	4.25	3.20	3.95	4.09	0.77	1.64	3.50	6.40	48.54
1868 .....	6.20	0.90	5.40	3.65	5.93	4.95	1.17	4.29	6.72	1.30	1.72	2.82	45.05
1869 .....	1.87	4.05	5.40	3.94	5.95	4.54	0.90	2.10	3.05	2.97	4.74	3.47	42.98
1870 .....	7.13	3.47	3.93	2.37	2.37	3.80	3.20	2.55	1.20	2.43	1.56	2.13	35.13
1871 .....	2.52	4.39	4.74	2.77	3.16	2.30	3.82	4.06	0.47	1.00	3.07	3.75	36.05
1872 .....	0.75	2.22	1.04	7.18	4.15	6.67	5.16	3.55	3.17	4.05	.....	.....	37.94
Mean .....	4.17	2.98	4.31	3.63	4.39	4.16	3.73	3.01	4.64	2.05	2.86	4.05	43.60

TABLE No. VIII.  
*Monthly and Annual Quantity of Snow in Inches and Hundredths.*

YEAR.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual amount.
1865 .....	31.00	2.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	33.10
1866 .....	1.10	0.10	.....	2.00	.....	.....	.....	.....	.....	.....	.....	1.83	6.13
1867 .....	19.20	11.75	9.00	.....	.....	.....	.....	.....	.....	.....	.....	20.25	39.95
1868 .....	9.00	1.00	0.50	3.00	.....	.....	.....	.....	.....	.....	0.05	2.35	15.90
1869 .....	2.00	1.30	0.90	0.10	.....	.....	.....	.....	.....	2.00	3.35	6.75	16.40
1870 .....	6.35	7.75	1.75	.....	.....	.....	.....	.....	.....	.....	8.00	.....	22.85
1871 .....	5.90	0.25	.....	.....	.....	.....	.....	.....	.....	.....	0.15	5.60	11.90
1872 .....	4.95	9.00	0.20	.....	.....	.....	.....	.....	.....	.....	.....	.....	14.15
Mean .....	9.81	4.16	1.54	0.64	.....	.....	.....	.....	.....	0.25	1.44	4.60	19.93

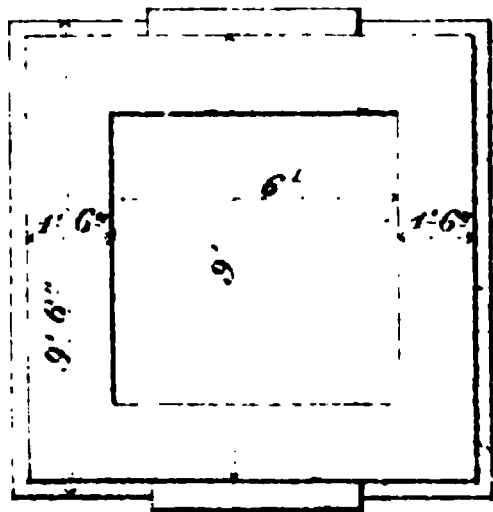
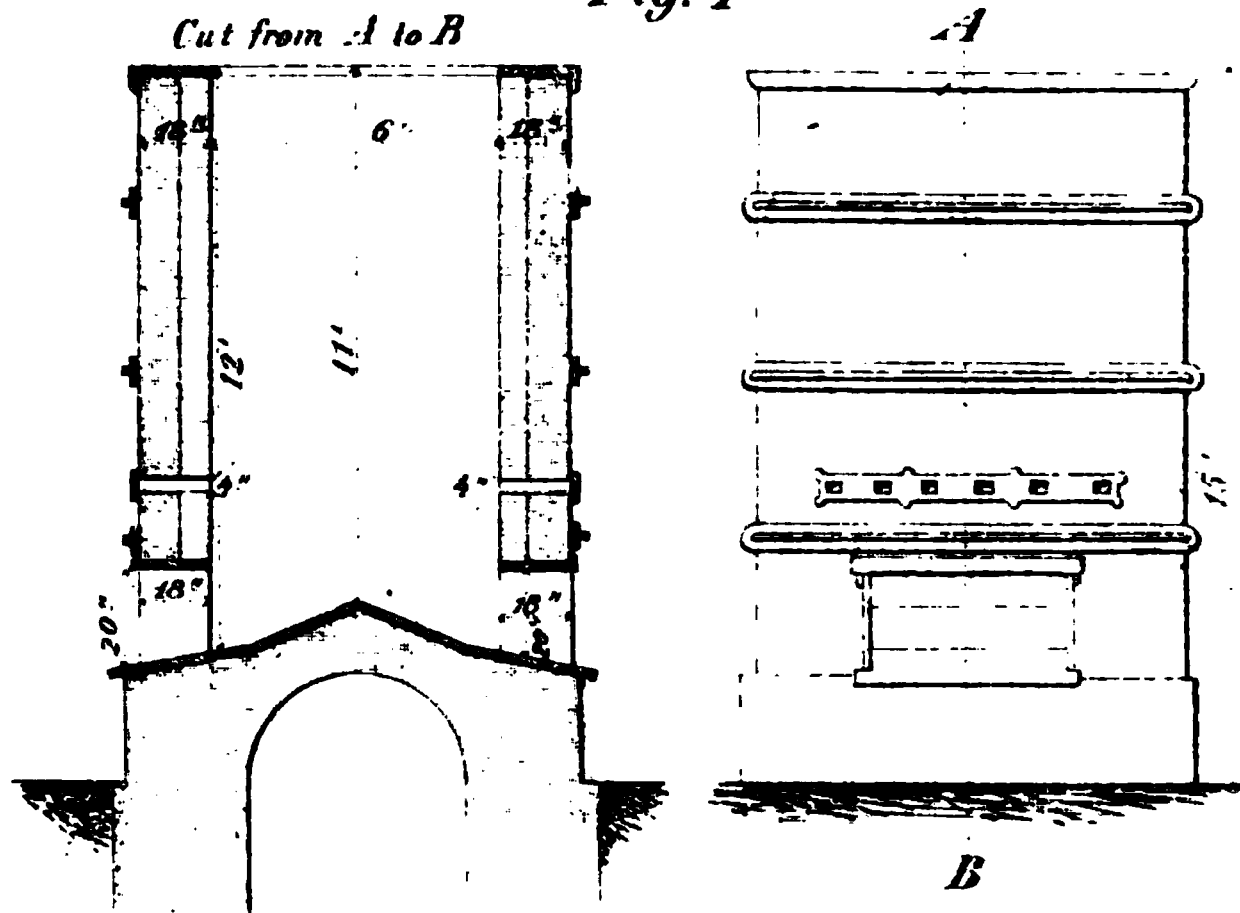
Through the kindness of my friend, Prof. J. W. Foster, LL. D., of Chicago, I have secured the privilege of publishing a highly valuable paper, on the manufacture of Spiegeleisen, from the pen of Hugh Hartmann, Ph. D., C. E., a graduate of the Polytechnical Academy of Berlin, late assistant in the Spiegeleisen Works of Hannover, Prussia, and now residing at Omaha, Nebraska.

E. T. COX,  
State Geologist.



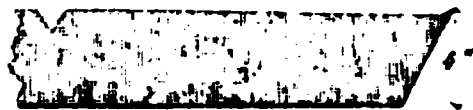


*Fig. I*

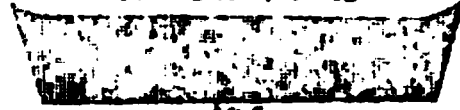


*Scale of Fig. I: 1" = 8'*

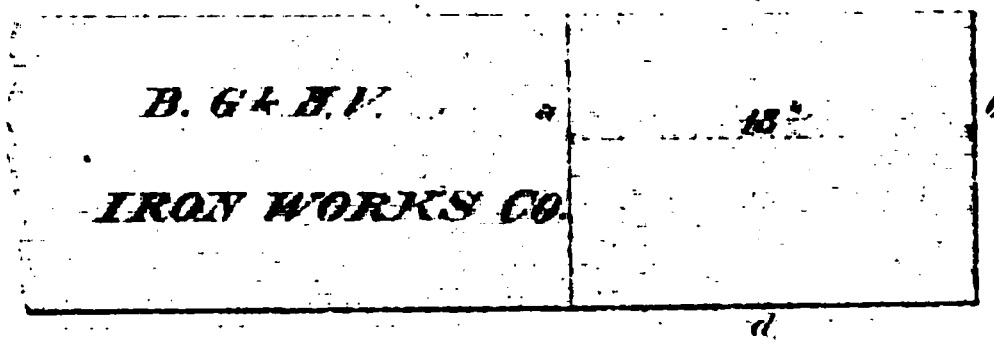
*Cut from a to b*



*Cut from c to d*



*Fig. VII*



MANUFACTURE OF

Spiegeleisen, Specular or Glittering Iron,

BY HUGH HARTMANN.

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Prof. J. W. Foster of Chicago, in his prominent and attractive letters on the new era "dawning upon the great industrial resources and mineral wealth" of the State of Indiana, (first published in the New York Tribune, and afterward brought together in a compact form, in compliance with a generally expressed wish), gives, especially in his letter on "American Bessemer Steel Rails," dated Chicago, 11th March, 1872, an explanation of the Bessemer process of steel making.

In this short but very comprehensive description of the "simple process," Prof. Foster says that the 10 or 15 per cent of Spiegeleisen which is allowed to flow into the mass of decarbonized iron in the "Convertor," is, up to the present time, mostly manufactured in Germany, and brought from there to this country.

Having been employed in that country during a series of years with an Iron Works Company, especially producing

the above mentioned kind of iron, I shall try to give to the readers of Prof. Foster's letters an explanation of the manner in which the manufacturing of the Spiegeleisen is, at the present time, produced.

The Spiegeleisen, specular or glittering iron, a pig metal which breaks into more or less large mirror-like facets, was formerly produced by charcoal, out of manganimiferous iron ores, its singular peculiarity being due to the presence of 10 to 12 per cent. of manganese, on which the Bessemer process depends for its success. The hot-blast furnaces were of small outlines, but always in splendid working condition. The stacks of the well-known Meisener Stahlberg Iron Works, and others in that vicinity, were built as follows:

Total hight of furnace.....	35 ft.	.....
Hight of tuyeres above bottom.....	1 ft. 3 in.	
Hight of hearth.....	5 ft.	.....
Hight of boshes.....	9 ft. 5 in.	
Diameter of tunnel head.....	3 ft.	.....
Diameter of boshes.....	9 ft.	.....
Diameter of upper part of hearth.....	2 ft. 8 in.	
Diameter of lower part of hearth.....	1 ft. 11 in.	

They were conducted with hot blast air of from about 300° to 480° F., the air forced into the furnace through two tuyeres of 2½ to 2¾ inches diameter, under a pressure of 1½ to 1¾ pounds per square inch. The average consumption of charcoal, per one hundred pounds pig metal, was about one hundred and eighteen to one hundred and twenty pounds; the average daily production during the year, nine thousand pounds, or four and a half tons. In the practical working of the furnace the spathic ores yielded about thirty-eight to forty per cent. of iron.

But, on account of the devastation of the forests and of the scarcity of hard wood suitable for conversion into good charcoal, this fuel, soon after the year 1859, proved insufficient for the large production of spiegeleisen wanted; therefore, they were compelled to make great efforts in replacing the charcoal by coke made from well prepared



bituminous coal, as a reducing agent, there not being in the iron manufacturing region a coal sufficiently free from sulphur and other deleterious materials to allow its use in a crude state. The spiegeleisen made with charcoal was a very valuable metal, due to the purity of the ores, entirely free from sulphur and phosphorus, and we all know that no metallurgic skill has thus far been able to expel these deleterious ingredients from any ores or coke, or prevent them from passing into the pig iron.

In Rhenish Prussia are some great and well conducted iron manufacturing establishments, (in the vicinity of Düsseldorf and Duisburg,) where, during the year 1860, the first trials were made of producing spiegeleisen with coke as the fuel. These first trials being a total failure, it is certainly a noteworthy fact that, nevertheless, the zeal of the iron-masters did not relax. On the contrary, the first, though a failure, was followed by a series of trials, and it is impossible to say how great and high a praise this persistence merits; but it required the skill of highly experienced men to solve the problem of this entirely new branch of work, while, at the present day, the fabrication of specular iron is common work to many well trained iron-masters. Having at last been successful, there are at the present time some eight or ten large blast furnaces, each producing daily some thirty tons of this valuable and peculiar pig metal.

In giving a detailed description of one of these establishments, I shall first speak of the iron ores, of which four different kinds are used.

*First:* Red Hematite, a very pure ore from the beds existing on the borders of the "Lahn," a larger tributary of the Rhine, in the province of Nassau. Of this ore there are two varieties; a harder and compact mineral associated with a calcareous gangue, and a softer and pulverulent hematite. Both varieties are entirely free from sulphur and phosphorous, containing from three to four cent. of manganese, a small per centage of alumina, water and silica. The presence of carbonate of lime in the body of the compact ore gives it a particular character and renders it eminently

fitted for mixing with other siliceous ores, there being in the ore fifty per cent. of iron and from ten to fifteen per cent. of carbonate of lime. This ore is highly esteemed for the reason that there is great economy in smelting, owing to the presence of a lime flux in its most favorable conditions. The soft pulverulent ore is richer, yielding fifty-five to fifty-eight per cent. of metallic iron in the practical working of the furnace. Both kinds are easily reduced.

*Second:* The products from decomposition of the specular ore—the German “Brauneisenstein”—of similar favorable constitution and equally free from obnoxious admixtures. It contains some water chemically combined ( $2\text{Fe}_2\text{O}_3, 3.40$ ), is porous in structure, yields about fifty to fifty-four per cent of iron and is more easily reduced than any other ore.

*Third:* Excellent spathic iron ore from the vicinity of Musen (Stahlberg), in which a certain proportional part of the iron—from eight to fourteen per cent.—is replaced by manganese.

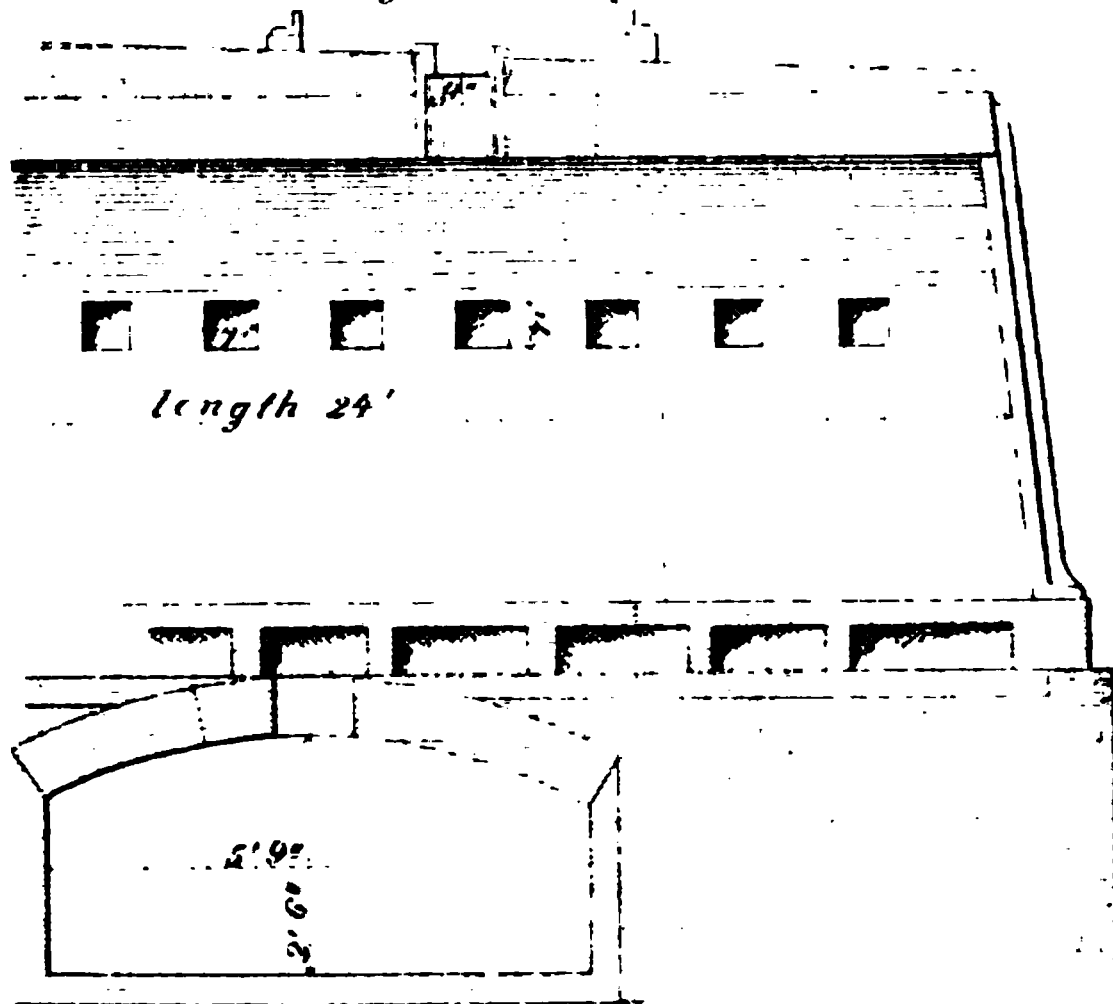
More or less, all the spathic ores ( $\text{Fe O}, \text{CO}_2$ ) contain a trace of sulphur, and afford therefor, and for expelling the carbonic acid gas, and the subsequent process of dispersion and decomposition of the formed sulphuric acid constitutes by means of the influence of the atmospheric moisture. The calcination takes place in kilns, for the outlines of which see Fig. 1, page 451. In these roasting furnaces, by distributing it in alternate layers with waste coal, the ore is rendered porous and easily broken into small pieces, whereby it is more readily acted upon in the smelting furnace. The chemical constitution of the ore in the crude state is, viz:

$\text{MnO}, \text{CO}_2 + 4\text{FeO}, \text{CO}_2$	{	Oxide of iron, - -	49.01
		Oxide of manganese, -	12.43
		Carbonic acid, - -	38.56

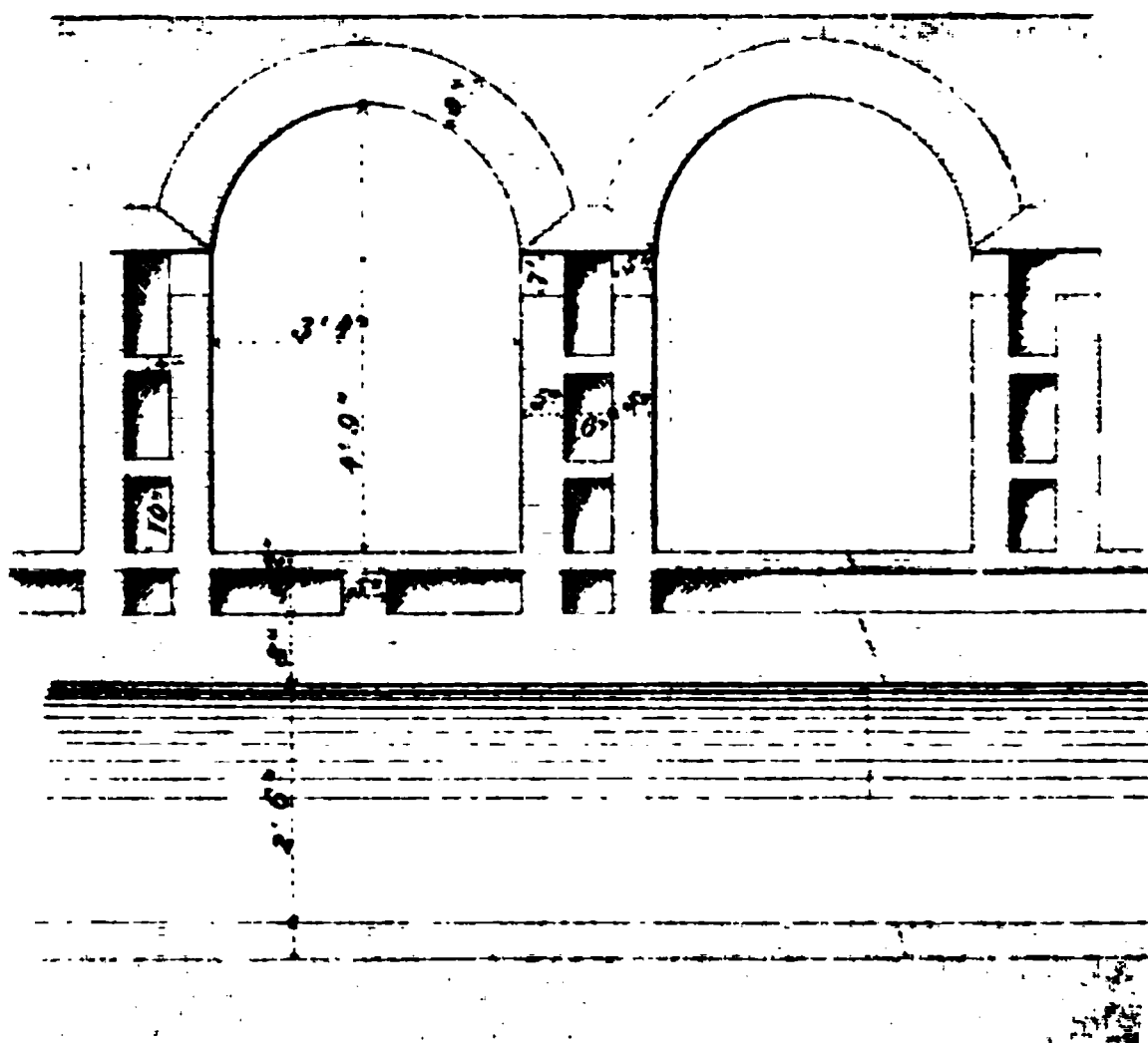
The above oxide of iron equals 37.85 per cent. of metallic iron. The above ore is changed by the calcining process into Sesquioxide of iron, - - 81.89 = to 56.78 metallic iron. Sesquioxide of manganese, - 18.11.



*Fig. II*  
*Cut through the Length*



*Cut through the Sides*



*Scale of Fig. II 1" = 4'*

*Fourth:* An aluminous ore, used for admixture with the above named ores to make a slag of a good natured character; it contains some 20 per cent. of iron.

A glance at a map of the county will show that these deposits of ores, being only from 80 to 100 miles distant are as easily accessible by navigation as by rail; the cost of transportation by railroad estimated at four and two-tenths cents per ton per mile, these ores are delivered at the furnace, by rail, at five to six dollars per ton.

To convey the ores from Nassau to the iron manufacturing centre involves a navigation of seventy-five miles at a cost of \$1.20 per ton, in addition to dockage and transfer from the docks on the Rhine, making the entire cost of the ore (including the purchase money) \$3.40 cents per ton.

#### THE FLUXING AGENT.

The flux is a very pure carbonate of lime, obtained in the vicinity of the iron works, from the borders of a small creek, the Dussell, the constituents of which are:

Carbonate of lime,	-	-	-	-	98.00
Silica,	-	-	-	-	1.50
Hygroscopic water,	-	-	-	-	.50

#### OF THE FUEL.

As a reducing agent coke is used (as above mentioned), the bituminous coals being purified prior to their application to the blast furnace. The coals are from the vicinity of the iron works and the ores are brought thither, for it is always cheaper to bring the iron ores into union with the coals, than the coal into union with the ores. They contain a good deal of slate and from 5. to 1. per cent. of sulphur, and to eliminate these noxious adherents they are subjected to a very careful process of grinding (to the size of a hazel-nut,) and separating by means of water, there being a difference between the specific gravity of pure coal on the one hand, and the slate and sulphur on the other, viz.:

---

Specific gravity of the coal,	-	-	1.21 to 1.51
Specific gravity of the slate,	-	-	2.64 to 2.67
Specific gravity of the sulphur,	-	-	1.96 to 2.05

Having been subjected to this process the coals are coked in closed furnaces (Frangois' system, fig. 2, p. 455), the charge of each furnace consisting of 120 sheppel a' 1.7-9 cubic feet a' 92-100 lbs. (1 sheffel = 1.5-6 bushels) covering the bottom of the furnace to a hight of 18-20 inches. The coking process lasts 36 hours, and furnishes from 57 to 60 per cent. of coke, by weight. of a porous, cellular character, sufficiently firm to hold up the burden of the furnace and containing 8 to 10 per cent. of ashes of a reddish white or gray color. The volatile carbonic matter of the coals, after having been used to heat the partitions and floors of the coking furnaces, are sufficient to heat the steam boilers.

#### OF THE STEAM ENGINES:

Which produce the blast air. There are two eighty horse power horizontal engines, manufactured by the magnificent Seraing Iron Works Company, Belgium, of the most elaborate character, maintaining four blast furnaces; and one vertical one hundred horse power engine for a fifth furnace, and for reserve.

To regulate the movement of the blast-air, it passes next to a resevoir two hundred feet long, and six feet in diameter, and equal to five thousand six hundred and fifty-four cubic feet.

The principal dimensions of the horizontal engines are as follows:

Diameter of steam cylinder.....	3 ft. 3 in.
Diameter of blast-air cylinder.....	7 ft. 6 in.
Length of steam cylinder.....	6 ft. 0 in.

Producing, therefore, during each revolution of the fly-wheel, one thousand and sixty cubic feet, or by eighteen or nineteen revolutions per minute, eighteen thousand cubic feet, and with a loss by leakage, of twelve per cent., sixteen thousand eight hundred cubic feet.

The vertical engine has the same diameter of the steam cylinder as the foregoing, three feet, three inches.

Length of cylinder..... 7 ft. 9 in.

Diameter of blast-air cylinder..... 8 ft. 0 in.

By thirteen revolutions per minute, there will be eighteen thousand cubic feet of blast air, less ten per cent. for leakage.

Before being forced into the furnace, the blast-air is heated by means of the gases escaping from the mouth of the furnace and collected there by means of an apparatus described in another place. Two heating apparatus of the shape like figure 3, page 460, are sufficient to heat the blast-air of each furnace.

*Fifth:* The outlines of the Blast Furnaces (figure 4, page 465) are as follows, there being two groups of stacks constituted after the shape of No. 1, and No. 2:

	No. 1.		No. 2.	
	FT.	IN.	FT.	IN.
Height of furnace.....	54	.....	54	.....
Diameter of tunnel head.....	8	8	9	6
Diameter of boshes.....	15	2	15	3½
Diameter of hearth, (upper end).....	4	9	3	11½
Diameter of hearth, (lower end).....	4	9	2	10
Height of hearth.....	6	3	7	9½
Height of boshes.....	11	9	10	8¾
Height of center of tuyeres above the bottom.....	2	5	2	5
Inclination of the boshes, fifty degrees.....				
Square contents of the mouth.....	59	.....	72	.....
Square contents of the boshes.....	180	.....	183	.....
Cubic contents of the whole furnace.....	6396	.....	5910	.....

The bottom and lower part of the hearth, as high as three feet above the tuyeres, are built with "Puddingstone," a coarse grained siliceous sandstone from Marchin, near Huy, Belgium, in the province of "des Andennes," a very excel-

lent and durable material, and the upper hearth, boshes and tunnel of the furnace with bricks formed out of the excellent fire clay from Andennes, Belgium.

The business of iron-producing is managed in the following manner. It must be previously borne in mind, and anxiously considered—this having been the problem which caused so much trouble and meditation to the iron-masters—that the spiegeleisen is chemically composed of four parts of iron and one of carbon (Fe. 4, C.), and that the combination is only formed during the period of the smelting process, which follows immediately after the deoxidation of the iron ores.

To fulfill the conditions under which this combination of iron and carbonic matter can take place it is absolutely necessary that the mixture of ores and flux be of the most fusible nature, so as to allow of the accumulation of the charge—in proportion to a fixed amount of coke—to such a degree, that the smelting and the separation of the iron from the slag occurs at a point as near as possible to the tuyeres. It is safe to say that this separation, when resulting at a higher place in the hearth would give too great an opportunity for the carbonic acid gas (Co. 2) to carry off some of the carbonic matter from the iron, changing itself into C. O. and reducing, at the same time, the constitution of the Spiegeleisen (Fe. 4, C.) to a lower grade of carbonization. The temperature at which the specular iron melts is the same as that at which its constitution is formed and is calculated to = 3582° Fahr.

It was therefore found necessary that the charges should be composed as follows :

30 per cent. red hematite.

38 per cent. spathic ore.

20 per cent. decomposed brown ore.

12 per cent. aluminous ore.

Yielding 40 to 50 per cent. metallic iron in the practical working of the blast furnace and to create the needed fusible slag there was added from 32 to 40 per cent of lime.

Each charge consisting of

1860 lbs. coke (according to six small wagons of three hundred and ten lbs. each.)



2800 to 3200 lbs. mixed ore.

800 to 960 lbs. carbonate of lime.

The furnace affording thirty-five to forty charges every twenty-four hours, and yielding an average of 60,000 pounds or thirty tons per day.

For a ton (2,000 lbs.) of pig metal, were consumed.

Iron ores, 4,000 lbs. = 50 per cent.

Lime, 1280 lbs. = 32 per cent. fluxing agent, yielding 37 to 87 per cent.

Coke, 2480 lbs.

The ashes of the coke are always found to represent in their chemical constitution the proportion of the

• Oxygen of the acids, 2:

Oxygen of the bases 1:

Even together with a part of 3:1, while the oxygen of the constituents of the always is of slag the proportion O. of B. 1: But it would be of the slightest influence to give the ashes a proportional admixture of flux (lime) because they will melt only at the nearest point to the tuyeres, or the *focus* where the whole process of smelting takes place, which if brought into calculation to join the ashes will always enter the slag formed by the other earthen materials accompanying the iron.

Nevertheless, it is absolutely necessary to accumulate so much of the lime in the slag, that the same will be of a caustic character, dismembering under the influence of the atmospheric moisture.

Slags resulting from many different kinds of chemical constitution (of different ores) will always admit more carbonate of lime than it seems to be possible considering their chemical constitution.

The blast air, with a temperature of from 630° to 660° Fahr. averaging above the melting point of lead, is forced into the furnace under a pressure of 2½ to 3 lbs. per square inch at the engine, and of 2.2 to 2.6 at the tuyeres.

Out of the five tuyeres two are on opposite sides and one at the rear of the furnace, each one declined a few degrees from the center of the hearth so as to force the blast-air into

a kind of whirlwind (fig. 5, page 465) which is considered the best way of distributing the compressed air through the smelting and combustible mass.

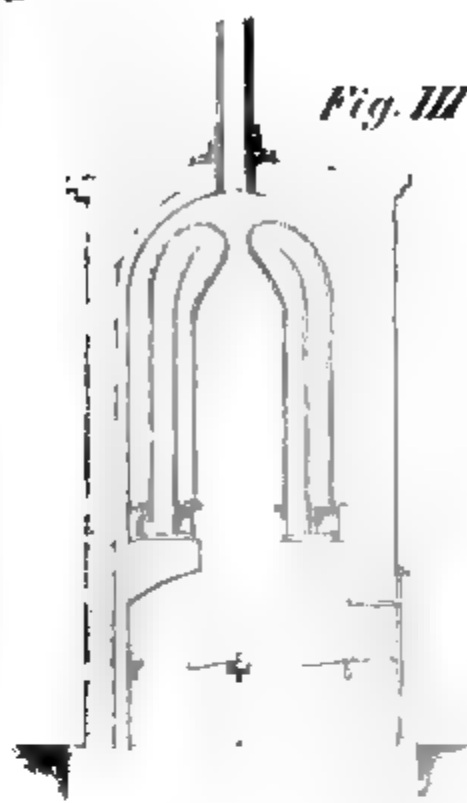
The diameter of the mouth of the nose-pipes varies from 2 to 3½ inches, according to the working condition of the furnace; each increase or diminution is made with one sixteenth of an inch. The nose-pipes are constructed in a manner so as to close the tuyers preventing the escaping or rebounding of the blast-air. (fig. 6, page 465.)

Owing to the high temperature in the hearth, the tuyers, and even the mass of stone forming the hearth, would not endure for any length of time, but being provided with a circulation of water (fig. 7, page 470) they last two or three years and over.

The signs of a good working condition of the blast furnace are, to an experienced eye, the following: The slag is nearly stony, showing a superamount of lime, only the edge being somewhat glassy, the color of the interior stony part is a light green or greenish yellow, covered on the outside with a thin brown coat; the slag flows steadily and easily over the sandstone, even to a considerable distance, proving thereby not only its own fluidity and warmth but also the existence of the desired and necessary heat in the hearth of the furnace.

The furnace is tapped every eight hours and the fore part of the hearth, as far as the tuyeres, is cleaned once during the time. The tuyeres are always clear and bright and very seldom need a mechanical cleaning, the flame escaping from the tunnel head of the furnace is without any smoke, not very hot and of a light reddish-blue color, (a hot, red flame indicating a change in the working of the furnace.) If the mouth of the furnace is closed by means of an apparatus to prevent the gases from escaping, so as to use them for heating the blast-air, they never show a temperature greater than between 140° and 176° Fahr.

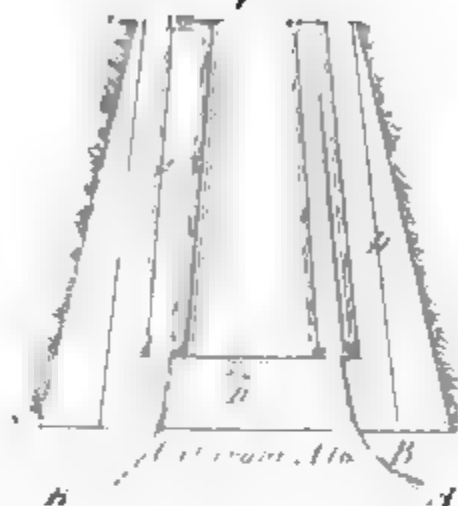
The metallic iron runs into large channels formed in sand, which are covered as soon as possible with a layer of dry sand to retard its cooling, thereby producing facets of a



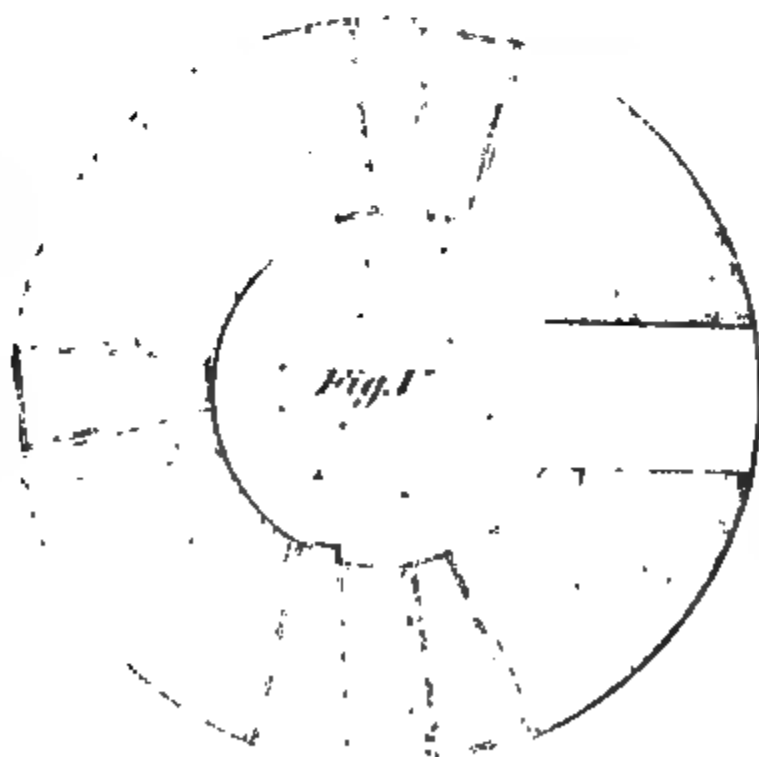
*Fig. III*



*Front View*



*Side View*



*Fig. I*



larger and brighter form, sometimes as large as the palm of the hand. The cold pig-metal is very brittle and sonorous; the surface of the casts are concave, the fracture representing the silvery facets, and its mean specific gravity of F. 1500.

Having thus far described, to a limited extent, the materials which are used in producing the spiegeleisen, and the manner in which the smelting process is conducted, there still remains a great deal more to say; but space will not permit a review of the many points embraced in this subject. The study of periodical phenomena, the study of the physical conditions of the materials and of the action of other different physical agents, is a subject worthy the attention of iron-masters.

(Signed,)

HUGH HARTMAN.

DESCRIPTION OF FIGURE 1, PAGE 451.

The kilns of the shape like figure 1, require for roasting process 100 lbs. of waste coal to each 1000 to 1500 lbs. of spathic ore, 100 lbs. of waste coal to each 500 to 600 lbs. of aluminous ore, and are sufficient to produce  $7\frac{1}{2}$  to 10 tons every 24 hours (about one-sixth to one-fourth of the contents of the kiln) of roasted ore. The loss, by calculation, of the spathic ore is equal to 21 to 25 per cent., of the aluminous ore is equal to 18 to 30 per cent. of moisture and other volatile matter. The spathic ore, as well as the aluminous ore, will attract some atmospheric moisture after being roasted, viz., the spathic ore from 2 to  $2\frac{1}{2}$  per cent., the aluminous ore from 4 to 5 per cent. The average cost of roasting the two ores is about 35 cents per ton.

FIGURE 2, PAGE 455.

The coking furnaces are three feet four inches wide by four feet nine inches high in the centre, and twenty-four feet long. There are generally from thirty to thirty-six furnaces connected in a "battery," the gases of which are conducted by means of the channel A to four steam boilers of twenty-five feet in length and seven and a half feet in diameter, each one with two boilers of two and a half feet diameter. The

coke is cooled by means of water, of which about three gallons is required to each bushel of coke. The cost of the coking process is something over three cents per 100 lbs.

FIGURE 3, PAGE 460.

There are fifty-two pipes in each apparatus of the shape like Figure 3, (representing a cut through the center line of a pipe), which are divided by means of a partition into two parts, so as to enable the blast-air to ascend and descend in each pipe. The latter are each of a length of from 10 to 12 feet; the surface exposed to the fire is 2429 square feet, and the cubic contents of the 52 pipes 460 cubic feet.

FIGURE 4, PAGE 465.

The tuyeres are made of copper and cooled with water, which enters at A so as to bring the coldest water to a point as near as possible to the greatest heat; the warm water runs off at B. The plates D, supporting the tuyeres, are also cooled with water, which is poured in from time to time before it is entirely evaporated. The tuyeres are mostly of the dimensions shown in the figure. The noise pipes of cast iron are fixed by means of a key, C, and bear on their extreme end a rounded ring which, when brought forward as far as possible, entirely closes the tuyeres.

FIGURE 7, PAGE 470.

The water comes from a higher point so as to be under a certain pressure, and enters the first reservoir, which is made of cast iron and covered for the purpose of supporting also a part of the brick work of the furnace. This reservoir A (of larger dimensions than the lower ones) and the following B and C, surround the furnace entirely. They are made in four parts, to give opportunity to move them easily in cases of necessity.

The water runs from A to B and C like the water of a cascade, and from the last point K to a large reservoir, from which a pump takes the supply to the steam boilers. The reservoirs B, C, and D are of wrought iron, and E of stone or cast iron.

## SPIEGELEISEN MANUFACTURING.

A few general remarks on the forming of the slag.

In commencing this second chapter I begin with a few general remarks on the great influence of chemistry in the metallurgy of iron.

No study can have a greater material significance than the one which gives a knowledge of the causes of accidents in the process of iron producing, and a knowledge of the means and natural laws which enables the iron master so to modify the working conditions of his blast furnace, that all the deficiencies and defects, which always will appear at times, can not deprive him of a certain success.

The history of scientific iron producing is particularly worthy of attention ; up to 1856 the directors placed at the head of iron manufacturing establishments in Germany and elsewhere, must be what people termed "practical men," and, according to such a principle, success would solely depend upon the practical skill and dexterity of men. But when new and greater demands were trying their knowledge and experience at a time when the want of iron increased by the development of railroads and every other kind of engineering work, and had reached dimensions previously unknown, it soon appeared that their experience, so highly prized, had lost its power over such new, and until then, unknown fields.

The years following after 1856 represent, therefore, a transition state of theory and practice, and while on the one hand too much reliance was placed upon the practical skill as the only attribute necessary, on the other, the theoretical skill was not more than in a state of development, and thus a very big struggle resulted in introducing science into the field of iron manufacturing.

At present, almost daily we read in the journals not only of experiments made, but of experience had under the guiding star of scientific skill, of chemistry ; a science almost unknown in such practical application some fifteen or twenty

years ago, and it is entirely safe to say that in our days the knowledge, the scientific knowledge of this art is the only ground upon which even practice can grow. I do not go too far in saying that knowledge of chemistry is the bottom of the modern system of iron producing.

The more one studies the course of development of the different manufacturing branches, and especially that of the iron which is called *spiegeleisen*, the more he will be impressed with the truth of this assertion. The success now before us is marvelous, and only scientific working was able to produce such unexpected results.

As mentioned in my previous letter, the mixture of the different ores and fluxes, or in other words, the chemical constitution of the slag resulting from the different earthen and silicious admixtures of the different ores and flux, form the ground upon which the whole process is founded.

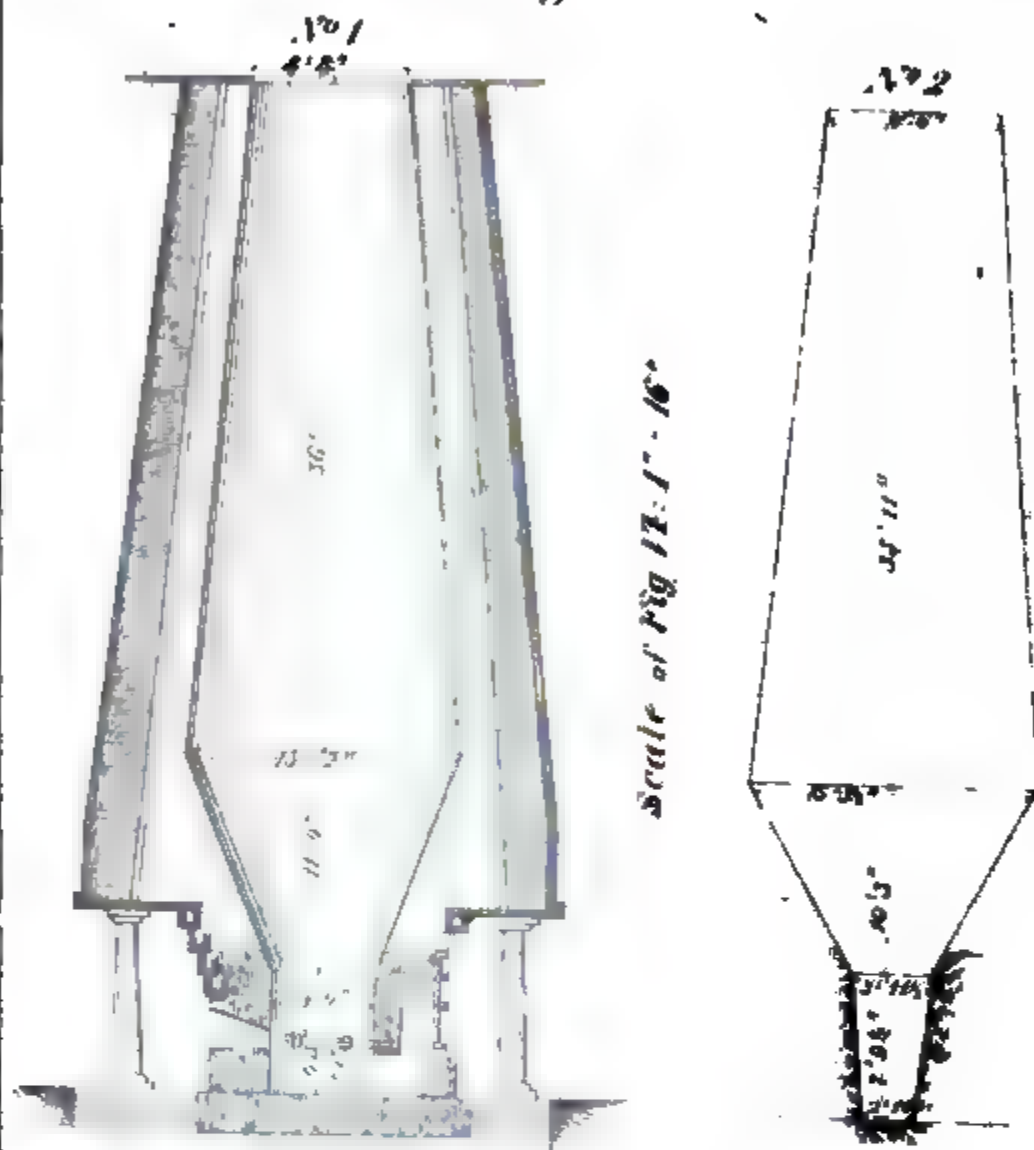
The principal rule in forming the slag is to supply it with more bases than the chemical constitution requires. It is necessary to know beforehand what mineral element the slag requires, and it will appear at first sight a very simple matter to have this question determined, but in looking over the several analyses made of ore from the same mine we do not find such a uniformity of the constituents of the ores which is desirable to render them reliable once and for ever as exact statements. Extended analyses of the ores, even of different places of the same mine, are needed; for those made of one place can not be made a rule for another. Hence it is necessary that well managed iron works always should keep at hand a large stock of ores, classified regularly according to their chemical constitution; and furthermore, that a well trained chemist be incessantly at work furnishing the analysis of each new ore.

I know there are, even in this country, many iron-masters who will laugh at such a conscientiousness, but I know by experience that, whatever any one may think about this assertion, it most assuredly can not be denied that all powers of the iron-masters in Germany, Belgium, and England are now concentrated in the laboratory, and this not



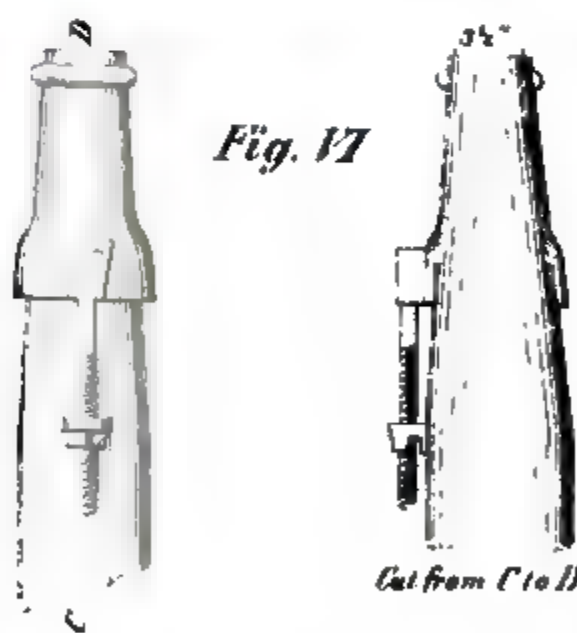


*Fig. II*



Scale of Fig. II. 1" = 16"

*Fig. VI*



Cut from C to D

Scale of Fig. VI. 1" = 16"

without success. The magnificent [glittering] iron which they produce is my proof.

#### THE CONSTITUTION OF THE SLAG, CHEMICALLY EXPLAINED.

It is not necessary to tell here the reasons why the different kinds of fuel (charcoal or coke) require each another rule for forming the chemical constitution of the slag. It is sufficient to say, because every iron-master knows this, that a blast furnace supplied with charcoal as a reducing agent requires a slag of the formula—

Oxygen of the acids : Oxygen of the bases, = 2:1 ; while the slag of a furnace supplied with coke must be of the proportion—

Oxygen of acids : Oxygen of the bases, = 1:1.

In the practical working the slag, which results, very seldom reaches this chemically calculated point accurately, but comes as near as possible to it, and I may say it is of the greatest importance that the management of the working conditions of the furnace permits extended variations, because without such possibility each management itself would be merely a chimera.

In every case where only lime can be used for introduction as a base to the silica, the strictly chemical, above mentioned, constitution (1.1) of the slag is without any question the best point in view, and I may mark this constitution by means of the formula:  $\text{Ca}^1\text{O}_3, \text{Si}^1\text{O}_3$ . But as stated before, the more other earthen bases are in the one itself, the more they serve the purpose of forming a well-natured, fusible slag, i. e., a compound with the silica. Particularly these earthen bases allow a deviation from the formula, by using coke for fuel, extending within the limits—

From  $\text{R}_2\text{S}_3$  to  $\text{R}_2\text{S}_2$ , even to  $\text{R}_2\text{S}$ .

Or otherwise expressed,

From Oxygen of the bases : Oxygen of the acids, =  $1\frac{1}{2} : 1$  or  $1 : \frac{2}{3}$ .

**THE QUANTITY OF THE SLAG COMPARED WITH THE  
AMOUNT OF IRON.**

Of the greatest influence in producing glittering iron is furthermore the quantity of the slag (by weight) compared with the quantity of iron; and it is proved by experience that the relation between these two materials being 1 : 1 is the best.

For when it would be more like,

1st.  $\frac{\text{Fe}}{1} : \frac{\text{Slag}}{2}$ , the working affairs of the furnace in general would be good enough, but a too large mass of slag always injures the iron by diminishing its quality in impregnating the same with too much silica. We know a certain amount of silica is of the greatest influence in the Bessemer process, but too much is also an evil, and it rests with the experience of the iron producer to determine this required amount of silica. At the same time a too large quantity of slag will afford too much carbonic matter for its own smelting, which would be worse than every other accident in the Spiegeleisen producing, because the forming of the constitution  $= \text{Fe}^{\text{C}}$ , requires a great amount of superfluous carbon.

2d.  $\frac{\text{Fe}}{1} : \frac{\text{Slag}}{4 \text{ or } 1}$  would be an unfavorable relation because there is not enough of the slag to cover the iron and protect it against combustion and decarbonization. The higher the pressure of the blast-air, the larger the quantity of slag required and I mentioned before that the usual pressure is from two and a half to three pounds per square inch.

It is therefore entirely erroneous, as some of the iron masters used to do, in working with a very hot blast-air to economize with the lime flux, because in every such case the quality of the iron will be deteriorated.

Of the greatest influence in forming the slag is also the Manganese.

One part of the Mn. O. forms with different other siliceous compounds a very fusible slag; another part of the oxidated manganese will lose its oxygen and join the iron, but of this part only another smaller portion remains. During a certain period of the cooling of the iron one can

observe the withdrawing of a more or less thin, scaly and blistery layer on the surface of the iron which is found to be composed of Mn. O, Si. O<sub>3</sub> together with a small portion of Fe O, Al<sub>2</sub> O<sub>3</sub>, and other bases. The compounding of the manganese and silica with oxygen, viz.: Mn. O. and Si. O<sub>3</sub>, takes place only at a time when the atmosphere adds to the moulten iron, so that the latter is enabled to join with the oxygen, for there is, without any question, in the molten iron only Mn. and Si. This peculiarity of the manganese to join the silica in the iron, forming Mn Si, which is of less specific gravity than the iron, gives the highly esteemed value to the manganiferous pig metal.

The next circumstance which has to be considered in this connection is the relation of

#### THE ALUMINOUS ORES

to the slag. The alumina acts as a base in regard to the silica whenever the latter is preponderating, and therefore an admixture of aluminous ore is as much an importance in producing the slag as the carbonate of lime.

Having so far explained the general points which the iron master should take into consideration when forming the calculations, I shall now proceed to point out especially the manner in which such a calculation is to be made:

The figures in the following tables are only supposed ones, for iron masters know that bringing entirely correct statements before the public would be an indiscretion, nevertheless they represent strictly the mode of operating.

Say the analysis of several ores are the following:

TABLE I.

	I Spathic Ore roasted.	II. Red Hematite.	III. Brown De- composit'n.	IV. Alumin- ous Ores.
Oxide of Iron .....	60.10	71.89	71.30	36.40
Silica .....	18.27	13.99	15.85	37.40
Lime.....	5.64	2.17	Trace.	9.12
Magnesia .....	2.04	1.25	2.05	2.10
Alumina .....	.50	1.87	1.20	7.98
Ox. Manganese .....	7.00	8.13	.....	1.34
Sulphur.....	.35	.....	.....	.14
Phosphorus .....	.....	.....	.14	.50
Water. ....	.85	1.38	10.10	4.00
	100.25	100.21	100.64	100.00

As shown in the previous letter from these different ores are taken

- Of No. 1 - - - - 38 per cent.
- Of No. 2 - - - - 30 per cent.
- Of No. 3 - - - - 20 per cent.
- Of No. 4 - - - - 12 per cent.

100

For mixture, and therefore the figures of Table I have to be calculated in accordance with this ratio. The product will be in hundred parts of mixed ore :

TABRE NO. II.

	No. I.	No. II.	No. III.	No. IV.	In 100 lbs
Oxide of Iron.....	25.12	21.57	14.26	4.37	65.32
Silica .....	6.94	3.92	3.17	4.48	18.51
Lime .....	2.14	.65	.....	1.09	8.88
Magnesia .....	.77	.37	.41	.37	1.92
Alumina.....	.19	.41	.24	.96	1.80
Oxide of Manganese.....	2.66	2.43	.....	.16	5.25
Sulphur .....	.13	.....	.....	.02	.15
Phosphorus.....	.....	.....	.03	.06	.09
Water .....	.13	.42	2.02	.98	3.05
Total .....	38.08	29.47	20.13	11.99	99.97

Henceforth these:

Oxide of Iron,	65.32 contains 41.76 per cent. metallic iron.		
Silica, - -	18.51 contains oxygen,	- -	9.80
Lime, - - -	3.88 contains oxygen,	-	1.17
Magnesia, - -	1.92 contains oxygen,	-	.76
Alumina, - -	1.80 contains oxygen,	-	.84
Oxide of Manganese,	5.25 contains oxygen,	-	1.18
Sulphur, - -	.16 contains oxygen,	-	.....
Phosphorus, - -	.09 contains oxygen,	-	.....
Water, - -	3.05 contains oxygen,	-	.....
	99.97	35.9	9.80

The formula of the Singulo Silicate requires that the oxygen of the bases should be 9.80, but being only 3.95 there is a deficit of 5.85, which is contained in 20.48 Ca O, or in 36.57 Ca O, C O2; the lime used as a flux contains 98 per cent. Ca O, C O2; therefore, 98 : 100 :: 36.57 : 37.32 per cent. of carbonate of lime for a fluxing agent.

To show the correctness of this calculation, the lime has to be added to the mixture of ores.

In 100 parts of the Ca O, CO2 are—

98.00 Ca O, C O2, therefore in 37 parts	36.57
1.50 Si O3.....	.55
.50 water.....	.02

Omitting the C O<sub>2</sub>, which will be withdrawn in the furnace, the slag will contain the following constituents:

Oxide of Iron.....	65.32 x	= 65.32 =	47.68 =	33.00 Fe
Silica .....	18.51 x	.55=	19.06=	13.91 with O=.737
Lime.....	3.88 x	20.48=	24.36=	17.78=5.07
Magnesia.....	1.92 x	= 1.92=	1.40=	.56
Alumina.....	1.80 x	= 1.83=	1.34=	.62
Oxide of Manganese.....	5.25 x	= 5.25=	3.33=	.86
Sulphur.....	.15 x	= .15=	.11=	
Phosphorus.....	.09 x	= .09=		
Carbonic acid.....	x	16.99=	16.99=	11.74=
Water.....	3.05 x	.18=	3.23=	2.35=
	99.97	38.20	137.30	100.14 7.11 7.37

We see, therefore, that the constitution of the slag will bear the proportion Oxygen of the Bases 7.11 : Oxygen of the Acids 7.37.

In regard to the quantity of the slag, the slag forming materials are represented by :

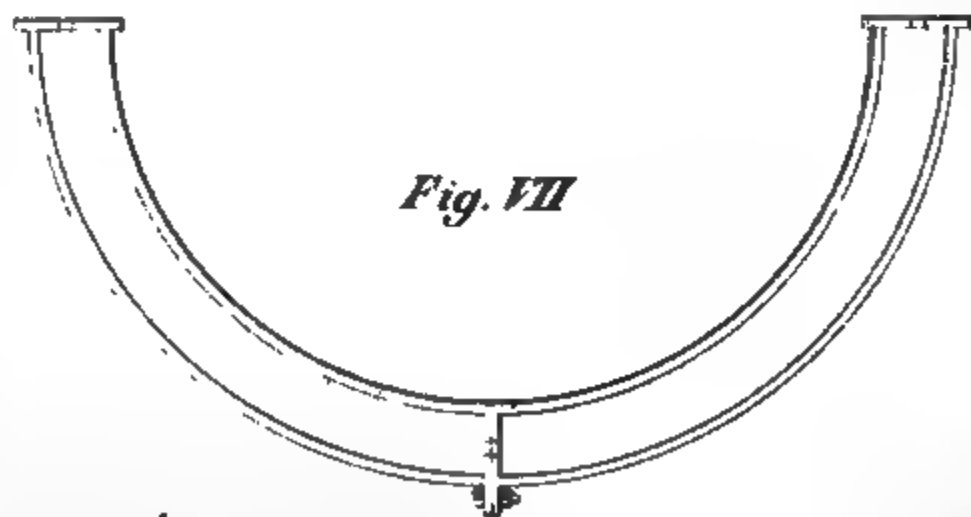
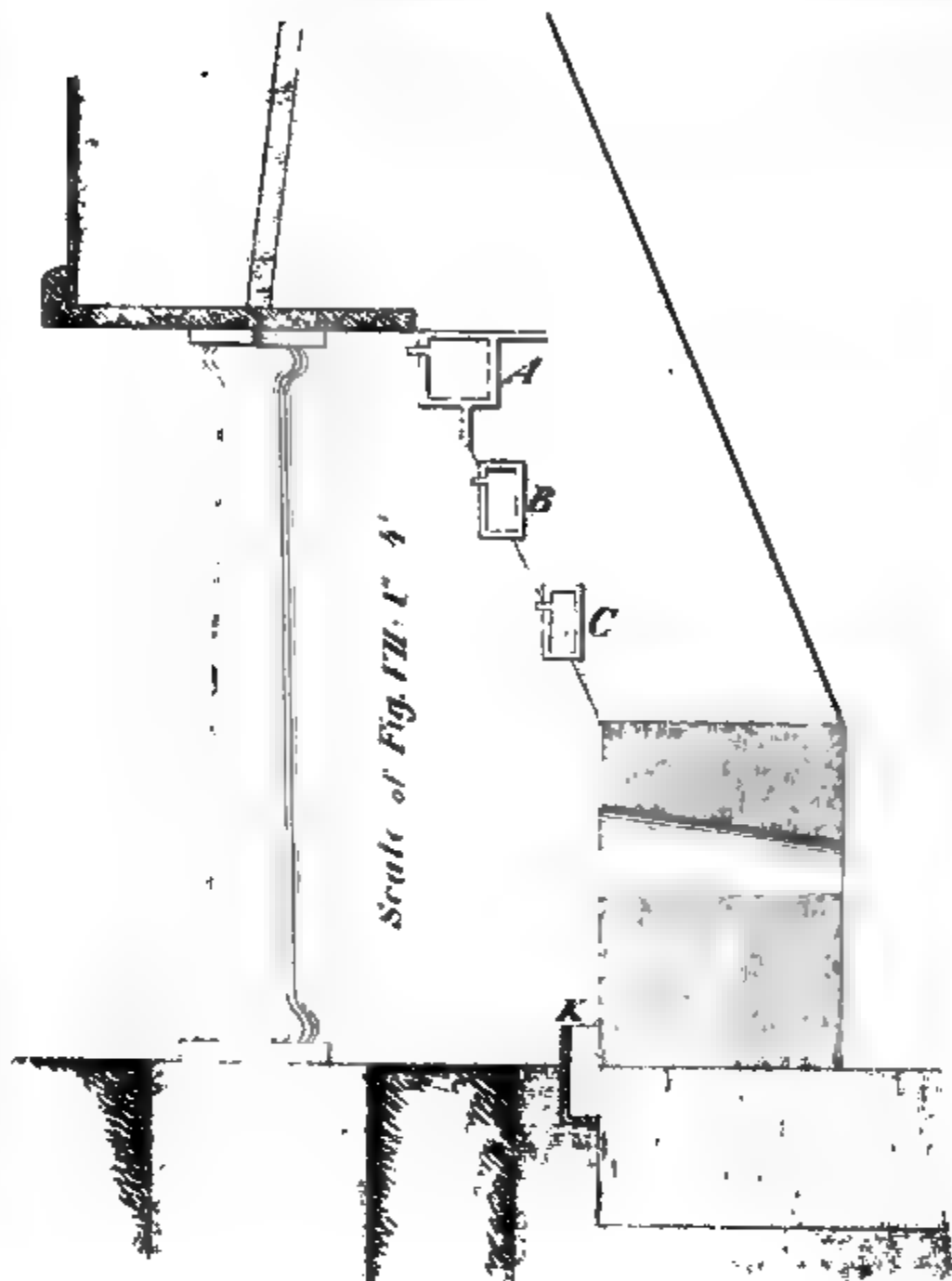
Silica .....	13.91
Lime .....	17.78
Magnesia .....	1.40
Alumina.....	1.34
	34.43

and the proportion of the slag to the iron is 34.43 to 33.06, being nearly equal.

These data explain fully the way in which the iron master forms his idea of the materials which he intends to bring into his blast furnace; nevertheless it is safe to say that in the working of the furnace many revolutions will appear which may seriously disturb this mode of operation, and therefore it is certain that theory without practice is worth no more than practice without theory; but this, I repeat, is the only true means of finding out, in the shortest time, the real causes of disturbance and irregularity.

Making use of the foregoing explanation in regard to the spiegeleisen, there is the first rule in composing the ores to







a good slag. Each slag will be of the most fusible nature, which is composed of more than one earthen base with silica, because such compounds act as fluxes on each other. And experience has proved that ores of a refractory character are more easily worked when mixed with other ores than when mixed with lime alone.

There are still three general remarks to be added:

1st. That neither the slag be too infusible.

2d. Not fusible enough.

3d. Not to accumulate too much ore in fulfilling the first condition in the spiegeleisen manufacture mentioned before.

To commence with the latter remark, there will not be heat enough in the furnace to produce Fe. 4 C., and, extended to a larger scale, even not heat enough to reduce the ores. The signs of a coming disaster, like this, are indicated by a slag which bears a glassy appearance throughout the whole mess, changing, by and by, to a dark-brown porous mass. This crude slag is at first very fusible, cools very quick, and after a few hours flows very slowly and thickly over the damstone, the tuyeres become darker, and the flame at the tunnel-head is very red and hot. The best remedy in such a case is less blast-air, a few charges of coke only, and smaller charges of ore.

If the mixture of flux and ore be too fusible, then the ores will melt before they are entirely reduced, the slag can not protect the iron from combustion in the vicinity of the tuyeres, and it will, therefore, be reduced to Fe O, which renders a dark black slag. The tuyeres will be clear but not clean, requiring frequent mechanical cleaning; the forming of a mass of unreduced ores and slag takes place in the centre of the furnace, which one can not see on account of the bridle tuyeres, but which can be easily observed by means of an iron bar thrust into the furnace through the openings in the tuyeres. The first indications of such a crude working state of a furnace are found in a quicker, irregular going down of the charges at the mouth of the furnace, and only less blast air but of higher pressure, forcing the charges to go down slower, is a remedy in this case,

until there is found opportunity to change the mixture of ores of flux.

The constitution of the mixture, where it is not fusible enough, produces a black slag indicating that the same involves the iron in the vicinity of the tuyeres, hindering its reduction; the heat decreases in the furnace. The best remedy for this state of affairs is more blast air with the same width of the nose pipes, less ore and flux.

I may now bring this letter to an end, but can not omit to say that the first development of the *Spiegeleisen* manufacturing, by means of coke, was attended by many difficulties, which at times seemed almost insurmountable. The first trials were met with many and great difficulties, calling forth the highest skill of the engineers, and at the same time with many expressions of doubt; and when at last it was definitely known that the science of metallurgy had overcome the greatest obstacles, there still remained in the minds of iron-masters an aversion to the new metal. The iron had to be introduced into the market and its merits made known, and iron-masters, reluctant to experiment with a material of such different quality from that they had been accustomed to use, must be induced to try the new metal. The first thing was to test its value, and bring it to the favorable notice of the iron-masters, experiments were made and proved that its freedom from sulphur and phosphorus, on the one hand, and the presence of manganese on the other, produced a metal unequalled in value by any known to commerce, except the small quantity produced by means of charcoal. Quantities of the new iron were soon introduced into the rolling-mills and other works, and the unanimous verdict of all who tried it was to the effect that it was preferable to the best iron previously known, and the only kind which would enable Bessemer steel manufacturers to bring into execution his (Bessemer's) manner of manipulating. Ever since that time the demand has exceeded the supply.

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# ERRATA.

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- Page 28, 20th line, for "4.5" read "4.05."  
Page 32, 5th line, for "Standard" read "Pioneer."  
Page 32, 8th line, for "Standard" read "Pioneer."  
Page 32, 11th line, for "Standard" read "Pioneer."  
Page 32, 14th line, for "Standard" read "Pioneer."  
Page 32, 24th line, for "4.09" read "8.09."  
Page 35, 25th line, for "per cent.," under the word "undried," read  
"evaporate pounds of water," and read the same under the word  
"dried" in the same line.  
Page 39, 14th line, for "when" read "where."  
Page 67, 7th line, for "generous men" read "gentlemen."  
Page 71, 10th line, insert "Loess" after "quaternary."  
Page 77, 6th line, for "palæchinus" read "palæechinus."  
Page 77, 8th line, for "valley" read "valleys."  
Page 81, erase "Upper Archimedes limestone" in section.  
Page 93, coal F, in section, is 4 feet thick.  
Page 102, 13th line, for "was" read "is."  
Page 107, 7th line, after "coal" insert "K."  
Page 107, 11th line, for "but" read "and."  
Page 107, 12th line, for "too great a" read "to a great."  
Page 107, 30th line, for "of" read "at."  
Page 138, 18th line, for "this" read "the Loess."  
Page 155, 32d line, for "island" read "inland."  
Page 187, 11th line, for "Meinrod" read "Meinrad."  
Page 193, 32d line, for "intercolations" read "intercalations."  
Page 199, 3d line, erase the word "inclusive."  
Page 199, 25th line, for "bed" read "led,"  
Page 199, 26th line, erase; after "layers."  
Page 200, 15th line, for "the by" read "by the."  
Page 200, 20th line, for "the" read "this."  
Page 203, 37th line, after "supply" insert "afforded."  
Page 204, 9th line, for "southwest" read "southeast."  
Page 207, 6th line, erase "county."

- Page 211, 1st line, for "McCane" read "McCain."
- Page 218, 5th line, for "Stigmara, Fucoides" read "Stigmara ficoides."
- Page 221, 21st line, for "Laughbemies" read "Laughbenner."
- Page 227, 18th line, for "brvidens" read "bovidens."
- Page 231, 23d line, for "Vora" read "vorax."
- Page 234, 8th line, for "following" read "flowing."
- Page 235, 16th line, for "as" read "are."
- Page 247, 20th line, for "Piscina" read "Discina."
- Page 247, 21st line, insert comma after "Productus."
- Page 248, 11th line, insert "it" before "is."
- Page 250, erase 3d and 4th lines and first half of 5th.
- Page 263, 7th line, for "Demetts" read "Demotts."
- Page 264, 86th line, for "Taylor" read "Traylor."
- Page 273, 19th line, for "partings" read "divisions."
- Page 275, 29th line, for "Henke" read "Henke."
- Page 276, 20th line, for "shale" read "clay."
- Page 279, 12th line, for "To the southeast of Snake Knob, seven miles distant, is seen Detney Hill, twelve miles southsouthwest. Stendal, eleven miles due east," read "Seven miles to the southeast Snake Knob is seen, twelve miles southwest is Detney Hill, and Stendal eleven miles due east."
- Page 280, 16th line, erase semicolon after "beneath."
- Page 283, 10th line, for "quantity" read "quality."
- Page 286, insert "which" after "and."
- Page 287, 25th line, for "to" read "of."
- Page 295, 16th line, for "Pentramites" read "Pentamerus."
- Page 300, 17th line, for "Metanonongs" read "Monona."
- Page 302, 10th line, for "athyris" read "and Athyris."
- Page 302, 29th line, for "legathephyllleice" read "Cyathophylloid."
- Page 302, 37th line, for "Orthocera" read "Orthocerata."
- Page 304, 32d line, for "running" read "mining."
- Page 305, 16th line, for "Mound" read "Monon."
- Page 305, 31st line, for "Knobston" read "Knobstone."
- Page 306, 9th line, for "alluvium" read "clay."
- Page 306, 19th line, for "pentamerous" read "pentamerus."
- Page 307, 8th line, for "auritisma" read "euritines."
- Page 307, 9th line, for "setigara" read "setigera."
- Page 307, 10th line, for "Pentamerous" read "Pentamerus."
- Page 307, 17th line, for "their" read "these."
- Page 307, 22d line, for "Pentamerous" read "Pentamerus."
- Page 307, 34th line, for "variety, the" read "the variously."
- Page 308, 1st line, for "beaches" read "benches."
- Page 309, 17th line, for "Pentamerous" read "Pentamerus."
- Page 312, 24th line, for "polymorphia" read "polymorpha."
- Page 315, 20th line, for "dumosem" read "dumosum."
- Page 315, 21st line, erase comma after "Calymene."
- Page 315, 28th line, for "on" read "an."

- Page 316, 7th line, for "Rosa" read "Rose."  
 Page 316, 19th line, for "dam and mill" read "demand will."  
 Page 316, 30th line for "Falry" read "Farley."  
 Page 316, 32d line, for "train" read "tram."  
 Page 317, 31st line, for "Zygospersa" read "Zygospira."  
 Page 318, 5th line, for "expanse" read "exposure."  
 Page 318, 31st line, for "Shelby's" read "Shelly's."  
 Page 319, 16th line, for "fire" read "bore."  
 Page 319, 23d line, erase "jeler."  
 Page 319, 29th line, for "stem" read "stone."  
 Page 321, 6th line, for "south" read "north."  
 Page 321, 21st line, for "rocky band" read "lime rock bed."  
 Page 322, 4th line, erase comma after "Bumastis."  
 Page 322, 34th line, for "Lyde's" read "Lynch's."  
 Page 323, 6th line, for "building" read "burning."  
 Page 323, 16th line, for "supremacy" read "existence."  
 Page 323, 20th line, for "infringes against" read "impinges on."  
 Page 324, 17th line, for "division" read "deposit."  
 Page 325, 33d line, for "sand-" read "mud-."  
 Page 327, 25th line, for "at" read "in."  
 Page 327, 27th line, for "city" read "county."  
 Page 328, 11th line, for "J. H. Pettit" read "J. U. Pettit."  
 Page 330, 14th line, for "lime" read "lower."  
 Page 332, 32d line, for "Athyrus" read "Athyris."  
 Page 335, 7th line, for "Gleeson's" read "Greeson."  
 Page 335, 30th line, for "successive" read "several."  
 Page 336, 8th line, for "Detenbaugh's" read "Defenbaugh's."  
 Page 336, 11th line, for "west" read "water."  
 Page 336, 18th line, for "Detenbaugh's" read "Defenbaugh's."

From page 189 to 336 of this report, the author had no opportunity of correcting the proof sheets, which accounts for many of the errors in text and orthography.

The numbers referred to on page 199, line 19; page 204, line 13; page 207, line 17; page 211, line 18, were originally attached to the different divisions of the "General Section," but were omitted for want of room on the pages.











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